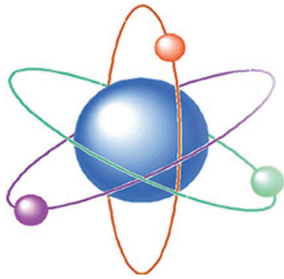


ISSN 2349-3089



# NeJCR

NORTHEAST JOURNAL OF  
CONTEMPORARY RESEARCH

Vol. 3 Number 1, November 2016



DARRANG COLLEGE RESEARCH JOURNAL

No. 1CB

Vol 3 Number 1

Nov 2016

# **Northeast Journal of Contemporary Research (NeJCR)**

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### **Publisher :**

Principal, Darrang College, Tezpur, Assam

ISSN 2349-3089

# Northeast Journal of Contemporary Research

Vol. 3 Number 1, November 2016



**NeJCR, Darrang College,**  
Tezpur-784001, Assam, India  
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## *Editorial*

### **Earthquake Disaster in the North East India: Preparedness as the key for Mitigation**

Wedged between the collision boundaries of the Himalayan plate in the north and the Indo-Burmese plate in the east, the North Eastern region of India is one of the seismically most active regions of the world. Based on the geotectonic features, history of past seismic events and potential hazards from earthquakes, the region has been categorized as zone V in the seismic hazard zone map of the Indian subcontinent (IS1893:2002). According to a hazard map produced by the Global Seismic Hazard Assessment Programme, the North East India can expect to have peak ground acceleration (PGA) of 0.24g to 0.48g. Since 1897, 18 large earthquakes ( $M \geq 7.0$ ) including the two great earthquakes of 1897 and 1950 ( $M > 8.0$ ), occurred in this region, which caused a large-scale damage to the densely inhabited areas of the northeast India. The major Earthquakes in the history of this region were occurred in the year(s) - 1869 ( $M=7.5$ ), 1897 ( $M=8.7$ ), 1918 ( $M=7.6$ ), 1930 ( $M=7.1$ ), 1947 ( $M=7.75$ ), 1950 ( $M=8.6$ ) and 1951 ( $M= 8.0$ ).

The Great Assam Earthquake of 12<sup>th</sup> June, 1897 (the most severe earthquake occurred in the Indian Sub-continent) rocked entire Northeastern region of India, Bangladesh, West Bengal, Bihar and parts of Mynamar and Nepal ( $M = 8.7$ ) was one of the largest known earthquake anywhere in the world. The quake wrecked havoc across south-west of the present states of Assam, Meghalaya and Bangladesh. About 1542 people were killed and hundreds more injured. The Great Assam Earthquake of 15<sup>th</sup> August 1950 ( $M = 8.6$ ) was the second strongest earthquake among all the Indian great earthquakes. This is located in the Indo-China border (Seeber and Armbruster, 1981; Dasgupta, 1993). Six earthquakes of 1869, 1897 (great earthquake), 1918, 1923, 1930 and 1943 locate from within the Mikir Hills massif (MHM) of the Shillong plateau. It means that a frequent and major earthquake, in the long term basis prediction, is likely to occur in this region. Seismotectonic analysis of the eastern Himalayan zone has clearly indicated that many of the transverse strike-slip faults are active producing most of the earthquake events in this zone (Dasgupta *et al.*, 1987; Nandy, 2001).

Of the many natural disasters, earthquakes are the most difficult to predict. The best of earthquake warning systems, such as the ones installed in Japan, are only capable of warning regional centres about the possible impact of ongoing earthquakes. The modern Geoinformatics tools such as “HAZUS”, a software program developed by Federal Emergency Management Agency (FEMA) and “SELENA”, a software developed by NORSAR of Norway, could be applied for estimation of loss using primary as well as secondary data on building stock, utility services, demographic, social, economic information, geological, geotechnical, transportation data, etc. The real advancement that has been made recently in India is, for instance, the “setting up of many seismological stations”, especially after the Bhuj earthquake of 2001. Measurements from these stations and global positioning system data now tell us the Indian plate is moving north at a speed of 5 centimeter per year. This would contribute to stress accumulation and to more seismic activity in coming years.

There are different ways of mitigating earthquake related disasters — building structures that are relatively quake-resistant, preparing for evacuation by constructing centres specifically for the purpose, and sensitising the public about quakes and their devastating impact. Earthquake disaster mitigation components are: pre-earthquake phase of preventive and preparedness activities, phase of precursory phenomenon and earthquake occurrence, post earthquake emergency phase, post earthquake reconstruction and rehabilitation phase. Pre-disaster preventive and preparedness activities are: hazard zoning, earthquake prediction and warning, earthquake codes, laws, bye laws, retrofitting of existing structures, educational training, and emergency preparedness. Post disaster activities are of two types: short range activities *viz.* seismological and geophysical studies, engineering and technological studies. Long range activities are repair ,restoration and seismic strengthening of damaged buildings, pulling down unsafe, unrepeatable structures and removal of debris, reconstruction of new buildings at old sites, relocation of whole villages or township with new planning and designing, creation of job opportunities for the affected people and their economic rehabilitation. Japan, which is a country prone to regular earthquakes, has shown the way on disaster mitigation and preparedness. For mitigation of earthquake hazard all seismogenic faults in the area should be properly identified and mapped in 3D. This is also required for future development planning and construction of life line structures (Kayal *et al.*, 2006).

The devastating impact of the earthquakes may be mitigated with awareness and some preparedness. Besides the structural vulnerability, the disaster can be made much worse due to the vulnerability of the community itself. The factors that make a community more vulnerable to disasters are economic backwardness or poverty, ignorance and illiteracy, the social fabric and living habits etc., since these conditions lead to poorer constructions with little or no maintenance, very low level of awareness about natural disasters and practically no mental or physical preparedness to meet them when they occur. Therefore, appropriate preparedness and mitigation strategies should be adopted to reduce the impact of natural disaster. It is important to prepare for earthquakes and other types of emergencies. Being prepared for a major quake is not only prudent, it's proactive. Being a part of awareness mock drills should be arranged emphasizing how to react when an earthquake strikes and what to do when the ground stops shaking. Earthquake mock drills helps to prepare communities, school children, teachers, office workers and rescue teams for what must be done in a regular quake. There should be systematic resort to “disaster drills” to educate the public on what to do during an earthquake. Preparedness is the key to managing any more such disasters

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NeJCR

Vol. 3 Number 1, November 2016

*Science Section*





## Taxonomic Diversity and Utilitarian Aspects of Tejpat Spice

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### ABSTRACT

*Cinnamomum tamala* Nees & Eberm - the genuine source 'tejpat spice of commerce', is over-viewed in the present communication in context of its 'taxonomic aspects' like infraspecific categories, other sources of tejpat-if any, tejpat vs. bay leaves, and 'utilitarian aspects' like medicinal values & other utilitarian aspects, smaller the leaf size better the quality of tejpat spice, cultivation/propagation technique & processing, marketing, and 'other aspects' like insect pests of tejpat-if any, diseases of tejpat and their management, and related aspects & properties of tejpat.

**Key Words:** Tejpat spice, *Cinnamomum tamala*, Allied taxa, Taxonomic and Utilitarian aspects.

### INTRODUCTION

'Tejpat' is a kind of leafy spice obtained from a number of tree species belonging to the genus *Cinnamomum* Schaeffer under the family Lauraceae, of which *C. tamala* Nees & Eberm is the genuine source (**Figure 1**). However, the bark of *C. tamala* is also used as one of the sources of cinnamon spice. The inner dried bark of *C. verum* Presl. is the genuine source of cinnamon and known in trade as 'True or Ceylon Cinnamon'. The bark of *C. tamala* is known in trade as 'Indian Cassia Lignea' or 'Indian Cassia Bark' while it is known as 'tejpat' as regards the use of its leaves as spice. *C. tamala*, although considered as a source of cinnamon spice, it is rather used mainly as a source of tejpat leaf

spice which is being used widely in India from time immemorial. The barks of *C. tamala* are coarser than the bark of true cinnamon (*C. verum*) and inferior in quality. It is used as one of the common adulterants of true cinnamon (Baruah, 1998).

Dry leaves of *C. tamala* on the other hand, is, known in trade, as the 'tejpat leaf spice of commerce' and is recognized by International Organization for Standardization (IOS), Budapest Hungary, as a spice. The characteristic warm, powerful taste and smell like 'clove oil' of *C. tamala* leaf is due to the presence of an alcohol soluble essential oil where eugenol (up-to 78%) is commonly found as the main active ingredient.

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**Figure 1.** The genuine source of Tejpat (*Cinnamomum tamala*)

*C. tamala* is found mostly in India, Nepal, Bhutan, Burma and Bangladesh. In India, besides being the natural occurrence, *C. tamala* is found under cultivation mainly in the states of Northeast India including Sikkim and Pachim Banga.

**Vernacular names of Tejpat:** Tejpat is known in India by different names in different languages viz. in Assamese, Bengali and Punjabi as Tejpat, Gujarati as Tamalapatra, Hindi as Tejpat / Tajpat or Taj-kalam, Sanskrit as Tejapatra / Tamalapatra or Tamalaka, Tamil as Perialavangapallai / Perialavangapattai or Talis-happattiri, Telegu as Talispatri, etc, while in abroad by different names viz. in Arabic as ‘Sazaj hindi’, Burmese as Thitchubo, France as Cannelle, German as Zimtbaum, Japanese as Tamara Nikkei, Singhalese as Tejpatra, etc. (Baruah, 2011).

#### **TAXONOMIC DIVERSITY OF TEJPAT SPICE IN NORTHEAST INDIA**

A total of eight different taxa of *Cinnamomum* belongs to four distinct species

namely – *C. tamala* Nees. with five variants, *C. impressinervium* Meissn., *C. champokianum* Baruah & Nath and *C. sulphuratum* Nees are used as ‘tejpat’ spice in Northeast India (Baruah & Nath, 2004, 2015). The leaves of *C. impressinervium* are locally known in Dima Hasau District of Assam as ‘Best Quality Tejpat’ (**Figure 2**). This best quality tejpat spice are generally mixed with the genuine source (*C. tamala*) and sold in the local markets in the name (Baruah 2011, Baruah & Nath 2001, Baruah *et al.* 2000).



**Figure 2.** The Best Quality Tejpat (*Cinnamomum impressinervium*)

**Tejpat vs. Bay Leaves:** The leaves of *C. tamala*, which are known as tejpat, take in Indian cookery as spice the place of ‘Bay leaves’ (*Laurus nobilis* Linn., **Figure 3**) of Europe. *L. nobilis* is a plant which also belonging to the family Lauraceae likes that of ‘Tejpat’ or ‘Indian Cassia Leaves’ (*Cinnamomum tamala*). It has been seen in most of the Indian books and even the Academic syllabi of most of the Indian Universities that *C. tamala* plant is wrongly interpreted by the name ‘Bay leaves’. To break the confusion about the common names of these two distinct plant species - Tejpat should be written as ‘**Indian Bay leaf**’, while Bay leaves

otherwise may be called as ‘European Tejpat’ (Baruah, 2011).

‘Bay leaves’ also called ‘Laural leaves’ or ‘Sweet Bay’ or “True Laural’ are the dried leaves of *Laurus nobilis*. They grow in Mediterranean countries and are cultivated in Greece, Spain, Portugal and Central America. It is sometimes grown in Indian gardens but it does not seem to thrive well. Laural/Bay leaves are used whole or cracked. There is one more plant known as ‘Bay Laural’ (*Umbellularia californica* Nutt., Family – Lauraceae) which is often confused with ‘Bay or Laural leaves’. This plant is native to California.

The upper surfaces of the Bay leaves are green while their lower surfaces pale green or somewhat yellowish. Leaves elliptic, and size variable ranging from 2.5 – 7.5cm in length and 1.6 – 2.5cm in breadth. Dried berries of the tree commonly called ‘Bay berries’ have been imported into India for medicinal use. The berry is ovoid and 1.5cm long, black, coarsely



**Figure 3.** Bay Leaf or European Tejpat (*Laurus nobilis*)

The Bay leaves yield 1 – 3% essential oil with a characteristic sweet and spicy camphoraceous odour. The oil is colourless and with a cooling taste. The principle constituent of the oil is 1, 8 – cineole (up-to 50%). The other components present in the oil are  $\alpha$  – pinene,  $\alpha$  – Phellandrene, linalool, geraniol, eugenol, eugenyl acetate, methyl eugenol, etc.

## UTILITARIAN ASPECTS OF TEJPAT SPICE

**Medicinal values and other Useful aspects of Tejpat :** The leaves of *C. tamala* are carminative, and used in nasal and chest congestion, coughs, colic, diarrhea, rheumatism, gonorrhoea and in birth control. The leaf oil of *C. tamala* is reportedly a carminative, used for the treatment of colic, cough, diarrhea, gonorrhoea, rheumatism, irritations, boils, conjunctivitis, itching, sleepiness, loss of memory, urinary problems and fatigue conditions (Baruah & Nath, 2006).

Eugenol is the active ingredient of leaf essential oil of tejpat. Eugenol has been reported as antibacterial, anti-yeast, anticonvulsant, anti-mitotic, antioxidant, cell proliferation inhibitor, hypothermic and a skeletal muscle relaxant. The leaf essential oil of *C. tamala* is reportedly possessed antifungal activities against a number of both plant and human pathogenic fungus.

Eugenol smells intensely, taste pungently, possess a strong antiseptic activity and differ effectively a number of potential plant feeders. Eugenol is the starting material for making high quality vanillin. It is used for flavouring of food stuffs, especially meat, sausages, table sauces, etc., besides being used for the formulation of various pharmaceutical products like dental creams, mouth freshner, etc. Eugenol has been reported to possess activities against honey bee.

**Smaller the Leaf size Better the quality of Tejpat spice:** It has been reported that there are inverse correlation between the leaf size and eugenol percentage/content, *i.e.* the tejpat plant possessing smaller leaves generally contained higher percentage of eugenol in its leaf oil than those possessing larger leaves. Thus, it has been justified that ‘smaller the size of tejpat leaves is better the quality of its spicyness or vice-versa’ (**Figure 4**) (Baruah & Nath, 2000, Baruah, 2011).



**Figure 4.** Representative Herbarium specimens of the Variants of *Cinnamomum tamala*.

A. Variant I,                      B. Variant II,  
C. Variant III and                D. Variant IV.

#### **Cultivation and Processing of Tejpat:**

Meghalaya of Northeast India is the chief producer of tejpat spice (Anonymous, 1998). According to the data of Spices Statistics, Spices Board, Ministry of Commerce, Govt. of India, tejpat plant is grown/cultivated in more than 6010 hectares of land with production of more than 14,000 tonnes during 1995-96 (Anonymous, 1998). Besides Meghalaya where it is found abundantly both in wild and cultivated conditions up-to altitude of 1250m, is also found in Dima Hasau district of Assam up-to altitude of 1050m.

Germination, dormancy and viability of the seed of *C. tamala* Nees., the 'tejpat spice of commerce' have been studied by Baruah (2008). The fresh and matured depulped seeds with GA<sub>3</sub> (500ppm) treatment exhibits highest percentage (98.11) of germination. The seed indicate a dormancy period ranging from 7 to 42 days when are sown in nursery beds with proper shading and regular watering. With the increase of storage period, the seeds started losing viability.

In natural conditions, *C. tamala* is produce copious seeds and propagated by means of seeds. However, it has been noted that due to its aromatic pulpy pericarp as well as lack of suitable soil condition, not all the seeds

fall under the tree can not germinate and ultimately lost their viability on due course.

Since, it is a crop which is grown mostly as a wild and homestead crop, no special care is needed to cultivate the crop. However, applying manure can be practiced for increasing the yield. Mulching the tree with green leaf manure can be practiced. Weeding is done 2 to 3 times, till the trees are three to five years old, but for the older plants, weeding is done only once a year.

The trees are planted at a spacing of 3m x 2m apart in regular plantations. The seedling are raised in beds and planted out permanently when the plants are 4 – 5 years old. The tree takes 6 -9 years to grow and harvesting of leaves is done when the tree is 8 – 10 years old and continues for a century. No special care is needed for cultivation. Mature leaves are collected during October – December till March, *i.e.* after and prior to monsoon as rains affect the aroma and quality (eugenol percentage) of leaves, every year from young vigorous plants and in alternate years from old and weak plants. The leaves are collected (small branches with leaves are also tide in bundles), dried in Sun and marketed. Single tree yields about 9 – 10 kg. of leaves every year (Baruah, 1998, 2011).

**Marketing of Tejpat:** Shillong of Meghalaya followed by Jatinga (Haflong) of Assam of Northeast India is the main markets of tejpat from where it is being transported to other parts of the country and abroad. Tejpat leaf is exported in large quantities from India. From India, tejpat is exported to the countries like Australia, Belgium, Canada, France, Hungary, Japan, Kenya, Korea, Kuwait, Malaysia, Mozambique, Pakistan, Singapore, South Africa, Sri Lanka, Saudi Arabia, Taiwan, USA, UK, UAE, etc (Anonymous, 1998).

#### **OTHER ASPECTS OF TEJPAT**

**Insect pests of Tejpat, if any:** The genuine

source of tejpata spice (*C. tamala*) and 'best quality tejpata' (*C. impressinervium*) are found relatively free from pest and no insect pests have been reported in these tejpata sources. However, some gall formations are observed in both the tejpata species.

#### Diseases of Tejpata and their Management:

Very few diseases have been reported on *C. tamala* plant. Rust caused by *Aecidium cinnamomi* occurs during the onset of the south-west monsoon attacking leaves and young plants (Goswami & Bhattacharjee, 1973). Roy *et al.* (1976) reported die-back disease caused by *Colletotrichum gloeosporioides* in *C. tamala* plant. Shot hole caused by *Phomopsis tejpatae* (Singh, 1978) was reported in *C. tamala*. Shot hole diseases caused by *Pestalotia cinnamoni* and *Cercospora* sp. was reported in *C. tamala* (Rahman, 1951). Leaf spot and shot hole diseases of tejpata were reported (Rahman, 1951, 1962). Leaf blight caused by *Glomerella cingulata* and thread blight caused by *Marasmius pulcherima* has also been reported in Tejpata plant. These diseases do not cause serious damage to the plant – Tajpata (Rema *et al.*, 2006).

#### Related aspects and properties of Tejpata:

Joshi and Tandon (1989, 1990, 1991) reported the isolation and growth factor requirements of leaf gall induced by a mite on the genuine source of tejpata plant (*C. tamala*). The growth regulator required by gall tissue did not differ fundamentally from those required by healthy tissue. Optimum callusing of explants occurred on a medium containing 2, 4-D (10mg/l), kinetin (0.1mg/l) and beta-mercaptoethanol (1-2 mM). Callus grew better in a medium fortified with 2, 4-D (4 mg/l) and kinetin (0.4mg/l). Gall tissue grew faster than healthy tissue. Healthy tissue failed to grow in an auxin-free medium. One year old cultures of both healthy and gall tissue grew on a medium devoid of cytokinin for a long time. The addition of caffeic acid and catechol (pyrocatechol) enhanced the growth

of both normal and gall tissues, but these phenolics had no effect in the absence of auxin. Joshi and Tandon (1991) also reported that both normal and gall tissues showed indolepyruvic acid pathway of auxin biosynthesis. A direct correlation between tryptophane and auxin contents was recorded suggesting a substrate dependent regulation of IAA. Joshi and Tandon (1989) also observed a gradient of auxin protection activity in galls (from young to the brown stage). Three auxin protectors with molecular weights of about 200, 8 and 2 Kda, respectively were isolated from gall tissue using Sephadex gel filtration. These protectors appeared to be oligomers or polymers of lower molecular weight phenolic substances.

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## SNPs in SRY gene in yak (*Poephagus grunniens*), hybrids and back crosses and its relation with hybrid sterility

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### ABSTRACT

Many Y chromosomal and non Y chromosomal genes influences fertility in bovines among which role of SRY gene is important. Hybridization of yak (*Poephagus grunniens* L.) with indigenous cattle is a common practice in Himalayan belt resulting in F1 generation and Back Cross generations. Male individuals among the hybrids and Back Crosses suffer sterility. The present study is conducted with an aim to study SNPs and variation of the participating individuals of parental species, hybrids and Back Crosses. 288 individuals were taken pertaining to yak, indigenous hill cattle, F1 male hybrids and members from back crosses. DNA was isolated and SSCP was done to get characteristic patterns. Representative sample were custom sequences and analysed. Gene identity and homology studies have been done with NCBI-BLAST. SNPs were determined by multiple alignment in Clustal W with the help of BioEdit. *In-silico* translation was done by two methods, one with the help of selected frames of NCBI-ORF finder and the other without NCBI-ORF finder. Distinct SSCP patterns have been found. SNPs have been detected with both synonymous and nonsynonymous changes in the amplicon with likely change at the structural integrity of the protein. But in SRY (HMG) which is known to be highly conserved, no detectable change at amino acid level is observed. SNPs study of the SRY region of yak hybrids and back crosses reflected the insignificant influence of SNPs to the sterility of yak hybrids and back crosses.

**Key Words:** Yak, F1 hybrids, SSCP, SNPs, Polymorphism, *in-silico* translation

### INTRODUCTION:

Testis development in mammals is mostly under the influence of Testis Determining Factor (TDF) under the progressive response of SRY which is a Y-linked gene (Cheng *et al.*, 2001; Koopman *et al.*, 1991) and Yak (2n=60) is no

exception. SRY is an intronless gene (Su and Lau, 1993). There is a general perception that man made hybridization of agricultural and domestic animals is a modern scientific practice based on well defined scientific principle of classical genetics. However, contrary to popular belief hybridization is a thousand year old eth-

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nic practice; although such cases are rare. Yak is a rare and classic example of such category. Of the 65,000 yaks, Arunachal Pradesh alone accounted for 13,000 as per the 2003 census (Ramesha *et al.*, 2012). Ancient documents show that yak had been hybridized with ordinary cattle (*Bos taurus*) for at least 3000 years. The hybrids have superior vigor which increase their work efficiency as seen from their ability to carry more load and in ploughing land. The male hybrid offspring is sterile while female hybrids are fertile (Jianlin *et al.*, 1996). The size and productivity of hybrid animals from F2 onwards decrease substantially and not remunerative. The hybrid vigour persists only in the F1 generation and decrease in subsequent generation. This necessitates hybridization afresh. SRY (Sex determining Region of Y) gene is a candidate gene in the MSY/NRY (Male Specific Region of Y/ Non Recombining Region of Y) which is now proved beyond doubt as a TDF-Testis Determining Factor (Gubbay *et al.*, 1990; Koopman *et al.*, 1991). Many Y chromosomal genes control fertility in bovines among which SRY gene holds a lions share.

Su and Lau (1993) determined that the SRY is an intron less gene and there is a DNA binding HMG motif in the middle of the protein encoded by SRY. The size of the SRY transcript may vary from species to species. In human the transcript is 612 bp while in mouse it is 1185 bp. Compared to average eukaryotic gene this is very small. Full length copies of SRY have been obtained from mouse, human (Sinclair *et al.*, 1990), rabbit (Whitefield *et al.*, 1993) and bovine (Daneu *et al.*, 1995) species. The human SRY promoter lacks a TATA box which is present in all other species. Two groups have mapped transcription start sites for human SRY. Expression studies in mouse cell lines revealed two start sites for the SRY transcription at 137 and 78 nucleotide upstream of the ATG (Su and Lau, 1993). Another expres-

sion studies involving tissue where SRY is normally not expressed reveals that sites at position number 91 and 501 (Clepet *et al.*, 1993). The discrepancy between start sites suggests that tissues or tissue – specific factors may be involved in transcription of SRY locus. SRY protein contains a conserved motif which is remarkably similar in diverse organism. This conserved sequence is called High Mobility Group (HMG) and is known to be functional domain that bind to DNA. All mutation in the SRY gene associated with sex inversion have been located within the HMG box (McElreavey *et al.*, 1992). The central 200 bp HMG box revealed a very high degree of homology within the Bovidae family. Between the three sub family (Ovinae, Bovinae and Caprinae) more than 97% of homology is observed. Regarding the amino acid predicted sequence, the homology is total between sheep and the goat and three residues are different in the cattle HMG box region of the SRY gene. SRY helps as a transcriptional regulator that controls a genetic switch in male development by directing the development of supporting cell precursors (pre-Sertoli cells) as Sertoli rather than granulosa cells. In male adult brain involved in the maintenance of motor functions of dopaminergic neurons. Involved in different aspects of gene regulation including promoter activation or repression. Promotes DNA bending. SRY HMG box recognizes DNA by partial intercalation in the minor groove. Also involved in pre-mRNA splicing. Binds to the DNA consensus sequence 5'-[AT]AACAA[AT]-3' (Ohe *et al.*, 2002; Philip *et al.*, 2004; Li *et al.*, 2006; Murphy *et al.*, 2001). The search of Gen bank for SRY gene sequence in yaks indicated only 8 accession numbers viz., FJ373272, DQ336531, EF693876, EF693886, EU547257, AY079144, AB077320 and AF148463 (Ramesha *et al.*, 2012). The present study is anticipated with the aim to draw an inference between SNP found in SRY and its



HMG with the fertility status of the hybrids and back crossed of yak.

## MATERIALS AND METHODS

### Pedigree Chart and Cross Pattern of Hybrids:

A group of 288 individual pertaining to Yak, Hill Cattle and different hybrids of F1, BC1, BC2, BC3 such that Hill Cattle Male (n=11), Hill Cattle female (n=4), Yak male (n=224), Yak female (n=13), Dzo (n=17), Dzomo (n=3), Kauth male (n=2), Kauth female (n=2), Tui male (n=2), Tui female (n=2), Garr male (n=2), Cube male (n=2) and cube female (n=5) are taken for study figure 8. Yaks at NRC yak are maintained at Nykmadung under semi-intensive system. Mostly at the institute farm five types of Indian yaks are kept viz. Common Yak, Bare Back, Hairy Forehead, Bisonian Type and White Yak. The cattle male & female were maintained at Cattle Farm at NRC-Yak at a place nearby the institute. The F1 generation hybrid was made with artificial insemination of yak semen in cattle. The rest of the Back Cross were collected from field conditions and are not maintained at the institute. About 10 ml of blood was aseptically collected from external jugular vein in vacutainer tube containing EDTA (1mg/ml) as an anticoagulant. The tube was rolled gently in between two palms to ensure proper mixing of EDTA with blood sample. The tubes were properly labeled for identification. The samples were transferred to laboratory in an icebox and stored at -4°C till further use. Isolation of DNA was done within 24 hours of collection.

### DNA isolation:

High salt method as described by Montgomery and Sise (1990) with minor modification was employed for genomic DNA extraction from whole blood. The purity and concentration of DNA samples were checked by UV-VIS Spec-

trosopy. The optical density (OD) was checked at 260nm and 280nm in an UV spectrophotometer (Systronics-2202). Sterile distilled water was used as blank. The ratio of 260/280 OD was calculated. A ratio was found in between 1.7 to 1.9. The stock solutions were stored at -20°C and used for further analysis. The working solution was prepared by diluting the stock to 70 to 100 ng/μL for further PCR related work.

**Primers:** Six sets of primers have been used. The details of the primers have been provided in the Table-1 along with their sequence and author's who have described them. The primers have been procured from Chromas Biotech, Sahakar Nagar, Bangalore.

**PCR amplification:** The PCR reactions were carried out in final volume of 25 μl containing 10 m mol of tris HCl (pH 9.0), 50 m mol of KCl, 1.5 m mol of MgCl<sub>2</sub>, 200 μ mol of each dNTPs, 20 pmol of each primer, 1 to 1.5 unit of Taq DNA polymerase and approximately 70-100 ng of genomic DNA. The detail information of the PCR programme of the specific primer is provided in Table-6. The PCR product is then electrophoresed in 1.5% agarose (low EEO) in constant 100V and variable mA for 45 to 60 mins with 1X TAE buffer followed by staining the gel with Ethidium Bromide dye at 1ug/ml concentration. The loading dye used in the gel loading is 3-5 ul of 6X (Bromophenol blue 0.25%, Xylene Cyanol 0.25%, Ficoll Type 400 15% and water upto 100ml) dye. 100 bp DNA Molecular Size marker were also used during electrophoresis. The Gel is viewed in Gel Documentation Unit (Syngene, USA).

### SSCP analysis:

PCR amplicons were resolved in PAGE gel using vertical gel slab gel electrophoresis system (Bio Rad Protean II). The glass

plates were thoroughly cleaned with detergent and surface sterilized with 95% ethanol. Gel thickness was made 0.5 mm using appropriate spacer between the glass plates and the bottom and the sides of the glass plates were sealed. 12 % non-denaturing gel was prepared by mixing 22 ml of 20% (19:1) stock acrylamide, 18 ml 1X TBE , 200 µl APS (Ammonium persulphate 10%) and 70 µl TEMED. The solution was gently swirled and then poured into the space between the glass plates with 20 ml size sterile syringe. The glass plates were kept in vertical position with stand and camp. The comb was placed on the top of the gel and allowed to solidify for about one hour. After polymerization the comb was removed and top of the gel was washed with 2ml of TBE buffer (1X) to remove any unpolymerized acrylamide. Thereafter both the upper and lower tanks were filled with 1X TBE buffer. Pre run for 50 minutes was given at a constant voltage of 200 volt. 5 µl of denaturing solution (95% formamide, 10mM NaOH, 20mM EDTA) and 5 µl tracking dye (0.05% Bromophenol blue and 0.05% Xylene cyanol / 30% Sucrose) was added to the samples (PCR product). All samples were denatured in a thermocycler at 85°C for 13 minutes. Denatured PCR product was subjected to snap cooling by immediate transfer to ice to prevent renaturation of the denatured PCR product. The gel was run initially for 1 hour at 200 Volt and then at constant voltage of 375 volt for 10 hours. Thereafter the glass plates were removed and the gel was washed in double distilled water. Subsequently the gel was kept immersed in fixing solution (10 % ethanol) for 9-10 hours to overnight. The SSCP gels were stained after Sambrook and Russel (2001). Following which electrophoretic mobility and scoring the gel for their characteristic pattern was done.

#### **SNP Analysis:**

Following scoring of SSCP gels repre-

sentative sample products giving unique SSCP patterns were custom sequenced using automated ABI DNA Sequencer ( Chromas Biotech, Sahakar Nagar, Bangalore, India) to confirm the mobility shift in each pattern. Sequence data were analysed using BioEdit software Clustal W multiple alignments for detecting single nucleotide polymorphisms (SNPs) by comparing the observed sequence with corresponding templates AY079144 for SRY fragment 1, FJ373272 for SRY fragment 2 and DQ336531.2 for SRY fragment 6 (HMG) as shown in Table 2.

#### ***In-Silico* Translation:**

*In-silico* translation was done by two methods. The first method was done with the help of NCBI ORF finder and the best frame is selected with precise criterion ( like essentially presence of initiation codon and stop codon and with optimum length of the frame). The selected ORF frame of each representative population ( hybrids, back cross and parental species) were aligned with the help of BioEdit ( Sequence of NCBI ORF selected frames » translate or reverse translate permanent» ClustalW) as shown in table 4 and 7b. The second method was done without using NCBI ORF finder, simply by multiple alignment of the sequence with BioEdit , translate or reverse translate and subsequent Clustal W as shown in table 3 and 7a.

## **RESULTS**

The observed ratio of OD 260 to OD 280 was found to be in between 1.7 to 1.9 which is regarded as good in quality for the isolated DNA. The present study was conducted by using six sets of primer used to amplify amplicon across the SRY gene which is entron less. The size of the PCR amplicons are 525 bp, 336 bp and 183 bp (figure 1-3). Five partial sequence were deposited with NCBI whose ac-

cession number are from GU075408.1-GU075412.1. The PCR amplicons for these three SRY fragments are 525 bp (SRY Fragment-1), 336 bp (SRY Fragment-2) & 183 bp (SRY Fragment-6). Male yak, hill cattle and hybrids showed amplification in these SRY regions whereas their female counterpart have not (figure 1-3).

BLAST analysis of SRY fragment1 (525 bp) of Yak (*Poephagus grunniens*) has percent homology 99% (*Bos grunniens*), 99% (*Bos taurus*), 99% (*Bos javanicus*), 99% (*Bos indicus*), 98% (*Bos frontalis*), 98% (*Bos gaurus*), 96% (*Bubalus bubalis*). Similar analysis was also made for SRY fragment 2 (336 bp) which had percent homology 98% (*Bos grunniens*), 98% (*Bos taurus*), 98% (*Bison bonasus*), 98% (*Bison bison*). BLAST analysis of SRY fragment 6 (183bp) also confirmed the percent homology 99% (*Bos grunniens*), 99% (*Bos gaurus*), 99% (*Bos taurus*), 99% (*Bos indicus*), 99% (*Bos frontalis*), 99% (*Bison bonasus*), 99% (*Bison bison*) as shown in figure 5-7.

**SSCP Analysis:** PCR-SSCP studies revealed that SRY fragment 1 (525 bp), SRY fragment 2 (336 bp) and SRY fragment 3 (183 bp) is polymorphic in yak and hybrids as shown in table 2 and the rest i.e SRY fragment 3 (287 bp), SRY fragment 4 (205 bp) and SRY fragment 5 (130 bp) is monomorphic. The analysis of amplicon revealed unique SSCP patterns, four for SRY fragment 1, four for SRY fragment 2 and two for SRY fragment 6. The details are provided in table 1, table 5, figure 4 (A-C).

#### SNP identification:

Representative samples were custom sequenced to confirm the mobility shift in each pattern. The retrieved sequences representing each of the unique PCR-SSCP patterns were further analyzed by comparing these sequences with the corresponding SRY gene template se-

quence for *Poephagus grunniens* using Clustal-W multiple sequence alignment tool for detecting Single Nucleotide Polymorphisms (SNPs) and their respective amino acid substitution (table 3, 4, 7). In SRY fragment 1 (525 bp), two transversion at position 71 (F1 hybrid) and 73 (yak) and three transition at position 155 for both F1 hybrid and yak, 216 F1 hybrid and yak, 291 for F1 hybrid and yak were observed. The transversion to transition ratio is 1:3. For SRY fragment 2 (336 bp) there is transversion at position 772 one each for Yak and F1 hybrid and no transition. In SRY Fragment 6 (183 bp), no transversion was observed but transition was observed at position 1473 both for yak and hybrid (table 3 and 8). The total transversion observed in the three SRY fragment is two and that of transition is four. Total six SNPs have been detected. Thus the grand ratio of transversion : transition is 1:2.

#### DISCUSSION

Since SRY gene sequence are conserved and stable and hence it is rare to find polymorphism (Verkaar *et al.*, 2003). In this present study gene identity of the amplified product has been established with the help of NCBI BLAST and it was found that the amplified product has matched with the yak and related bovine sequence. The present study states that there are six point mutations two transversion and four transition (table 8b). All the substitution in all the two SRY fragments viz. SRY Fragment 1 (525 bp), SRY Fragment 2 (336 bp) are nonsynonymous (missense) which had corresponding change at the amino acid level except for the SRY fragment 6, 183 bp (which codes for HMG Protein) since any substitution in this region at amino acid level can have serious consequences.

*In-silico* translation using selected frame (by first method) by NCBI-ORF finder and their alignment revealed that for SRY

fragment 1 (525 bp) at position A191G in F1 hybrid and yak where asparagine is substituted to serine. For SRY fragment 2 (336 bp), SNP C55T and T57G in F1 hybrid where arginine has been substituted by tryptophan and SNP T77G & T78C in Yak where phenylalanine is substituted by cysteine (table 8b). But no amino acid substitution is shown in SRY Fragment 6 (183 bp). The substitution in amino acid SRY fragment 1 (525 bp) is of the similar nature i.e. asparagine (neutral), serine (aliphatic neutral). But the amino acid substitution in SRY Fragment 2 (336 bp) is arginine (basic) & phenylalanine (neutral) by corresponding tryptophan (neutral) & cysteine (neutral). In this fragment, the former substitution viz. arginine by tryptophan i.e. is different polarity which is likely to have a change in structure.

*In-silico* translation (by second method) without the use of NCBI ORF finder revealed that SRY Fragment 1 (525 bp) had three SNPs of nonsynonymous type and one SNP of synonymous type. SNP A71T in F1 hybrid, histidine is replaced by leucine and at SNP A73C in yak, lysine is replaced by glutamine. SNP G155A in F1 hybrid and yak glycine is replaced by aspartic acid. SNP G216A in F1 hybrid methionine is replaced by isoleucine. However SNP T291C is synonymous. *In-silico* translation of SRY fragment 2 (336 bp) revealed that SNP A772C both in F1 hybrid and yak, isoleucine is replaced by leucine. *In-silico* translation of the SRY fragment 6 (183 bp) revealed that SNP A1473G for both F1 hybrid and yak is of synonymous type and therefore no change in amino acid.

The substitution of histidine (neutral), lysine (basic), glycine (neutral), methionine (neutral) by subsequent leucine (neutral), glutamine (neutral), aspartic acid (acidic), isoleucine (neutral) in SRY fragment 1 and

substitution of isoleucine (neutral) to leucine (neutral) in SRY fragment 2 is likely to have an influence in the structure. In this six amino acid substitution, two cases i.e. substitution of lysine (basic) by glutamine (neutral) and glycine (neutral) by aspartic acid (acidic) there is change of charge which is likely to influence the structure of the protein (table 8).

Variations in the SRY gene can further be used for the association studies and marker assisted selection. Uehara *et al.*, 1999 found mis-sense mutation in the SRY gene in patients with the complete form of XY gonadal dysgenesis. Harley *et al.*, 2003 examined the SRY gene each with a mis-sense mutation of a conserved SRY-HMG box of the SRY protein.

However, in the present study both the methods adopted for *in-silico* translation no change is observed in SRY fragment 6 (183 bp) which codes for HMG motif (Table 8).

## CONCLUSION

The present study revealed distinct SSCP patterns of individuals of parental species, hybrids and back crosses. 6 SNPs are observed in yak and F1 hybrid and *in-silico* translation was performed. In two SRY fragments, SRY Fragment 1 and SRY fragment-2 both synonymous and nonsynonymous substitutions were observed. But the nature of substitution of amino acids in these fragments in F1 hybrid and Yak were different. In SRY fragment 6, no significant change was observed with respect to amino acid substitution. The present work does not find any correlation between the sterility status of yak hybrids and back crosses with the HMG region of SRY gene since no SNPs were found in the HMG region. The work also reflected the significance of SNPs which were found in the other region of SRY (non HMG region). The SNPs influenced mild or no effect in protein sequences as revealed in *in silico*

translation. Thus SNPs study of the SRY region of yak hybrids and back crosses reflected the insignificant influence of SNPs to the sterility of yak hybrids and back crosses.

#### ACKNOWLEDGEMENT

The author acknowledges DBT-Goi for the facilities provided with the help of Institutional Biotech Hub, Bodoland University and also Director, NRC-Yak, Dirang, Arunachal Pradesh for the facilities provided at the Institute .

#### AUTHOR'S CONTRIBUTION

SD has collected the sample from the hybrids, done wet laboratory experiments, analysed the data and designed the review. SJ, BCS, TB helped with the designing of primers and dry lab. experiments. KPR has helped in designing of the whole experiment, AKH has helped in compilation of the work.

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**Table 1.** Details of the primer used in the present study

Sl No	Primer Name	Primer Sequence	Len (bp)	Source	Prod Size	Post <sup>n</sup>	Polymorphic/Mono-morphic
1	Primer I SRY	FP 5'-GTCTGCTGCACCTTCATC-3'	18	Verkaar <i>et al.</i> , 2003	525	701-1226	Polymorp
	Frag. 1,	RP 5'-GTTTCATGGGTCGCTTGAC-3'	18				
2	Primer 2 SRY	FP 5'-CACCGCATATTATTTCTCCTC-3'	22	Jaykumar 2010	336	7 - 343	Polymorp
	Frag. 2,	RF 5'-AAGCCTTTTCCACTCATGCC-3'	20				
3	Primer 3 SRY	FP 5'-AAAACCTCAGAGATCAGCAAGCA-3'	22	Jaykumar 2010	287	297 - 584	Mono-morp
	Frag.3,	RF 5'-ACCGGCTTAATTGGCTTTC-3'	19				
4	Primer 4 SRY	FP 5'-CCAATTAAGCCGGTCACAGT-3'	20	Jaykumar 2010	205	571 - 776	Mono-morp
	Frag.4,	RF 5'-AGTGCCTTTGAGAGCGAGAG-3'	20				
5	Primer 5 SRY	FP 5'-CTTCATTGTGTGGTCTCGT-3'	19	Taylor 2003	130	1240-1370	Mono-morp.
	Frag.5,	RF 5'-TAGTCTCTGTGCCCTCCTCA-3'	19				
6	Primer 6 SRY	FP 5'-TGAAGCGACCCATGAACG-3'	18	Payen <i>et al.</i> , 1993	183		Poly-morp.
	Frag.6,	RP 5'-CGACGAGGTCGATACTTA-3'	18				

**Table 2.** List of primers responsible of the polymorphic amplicons with their template

Sl No	Primer Name	Primer Sequence	Template
1	SRY Frag-ment 1, Primer I	FP 5'-GTCTGCTGCACCTTCATC-3'	AY079144.3
		RP 5'-GTTTCATGGGTCGCTTGAC-3'	
2	SRY Frag-ment 2, Primer II	FP 5'-CACCGCATATTATTTCTCCTC-3'	FJ373272
		RF 5'-AAGCCTTTTCCACTCATGCC-3'	
3	SRY Frag-ment 6, Primer VI	FP 5'-TGAAGCGACCCATGAACG-3'	DQ336531.2
		RP 5'-CGACGAGGTCGATACTTA-3'	

**Table 3: Showing the BioEdit multiple alignment with SNPs and corresponding chromatogram.**

Sl No	Name	Bioedit alignment	Chro'gm	Bioedit alignment	Chro'gm	Bioedit alignment	Chro'gm
1	SRY (525bp)	<pre> Template AY079144      70      TTCTCC T 7 Hill Cattle G1    ..T.C T 8 Dzo NRC           ..T.C T 9 Yak Male 138     ..A.A T 10 Garr            ..T.C T 11 Hill Cattle G2  ..T.C T 12 Dzo 2           ..T.C                     </pre>		<pre> Template AY079144      160      TTGGTGGGTTT T 7 Hill Cattle G1    ..T.C T 8 Dzo NRC           ..T.C T 9 Yak Male 138     ..A.A T 10 Garr            ..T.C T 11 Hill Cattle G2  ..T.C T 12 Dzo 2           ..T.C                     </pre>		<pre> Template AY079144      220      ATATT T 7 Hill Cattle G1    ..T.C T 8 Dzo NRC           ..T.C T 9 Yak Male 138     ..A.A T 10 Garr            ..T.C T 11 Hill Cattle G2  ..T.C T 12 Dzo 2           ..T.C                     </pre>	
		F1 A71T, YA73C		F1 G155A Y G155A		F1G216A Y G216A	
		<pre> Template AY079144      290      CGCTT T 7 Hill Cattle G1    ..T.C T 8 Dzo NRC           ..T.C T 9 Yak Male 138     ..A.A T 10 Garr            ..T.C T 11 Hill Cattle G2  ..T.C T 12 Dzo 2           ..T.C                     </pre>					
		F1 T291C Y T291C					
2	SRY (336bp)	<pre> Template 1 Bos gru 81073272 770      TTGGGCTATG 01 EF 297 02 EF Dzo NRC 04 EF G3 05 EF Dzo1 06 EF Dzo2 07 EF Garr                     </pre>					
		F1 A772C, Y A772C					
3	SRY (183bp)	<pre> Temp 1 Bos gru 02336511.2 1470      AAGTATC 02 FP Yak male 164 03 FP Dzo nrc 05 FP G3 NRC 07 FP Dzo1 08 FP Garr 09 FP Tui 010 w9 ka                     </pre>					
		F1 A1473G, Y A1473G					

**Table 4: Showing BioEdit multiple alignment of selected frame From NCBI-ORF finder & in silico translation.**

Name of the fragment	Clustal W (with the selected frame using NCBI-ORF finder)	Corresponding Nucleotides	Chromatogram	Position
SRY (525bp)	<pre> Template AY079144 (-1)  MPPFLICDMPGCGQPPFPRRSESSLLVHAGVTVPCQSEHSRSIRLCLNREFVGVVPLNPLFISCHRRER* 07 yak male (-3) 08 yak male 194 (-2) 09 bo NRC (-2) 10 Garr (-2) 11 Hill cattle G1 (-3) 112 Dzo 2 (-3)                     </pre>	<pre> 190      TGGCGTGACGTG .....G.....                     </pre>		F1 A191G
SRY (336 bp)	<pre> Template FJ373272.1 (+1)  EHHSSWTSLGHNKVILATRISADFPFNKSLPEPLSCAYFQY FF1 FP Dzo NRC (+2) FF3 FP yak male 297 (+1) FF4 FP G1 THC1 (+1) FF6 FP Dzo2 (+1) FF9_FP Tui (+1)                     </pre>	<pre> 50      60      70 GGGACCGGTTGAGGAGGSHHTCCGCHD                     </pre>		F1C55T F1T57G Y T77G Y T77C



**Table 5.** Showing the frequencies of SSCP band pattern

Exon	Pattern	No of Observations	Frequency of SSCP variants
SRY Fragment 1 (525 bp)	Pattern A	33	0.2869
	Pattern B	16	0.1391
	Pattern C	53	0.4609
	Pattern D	13	0.1130
SRY Fragment II (336 bp)	Pattern A	27	0.3000
	Pattern B	10	0.1111
	Pattern C	41	0.2213
	Pattern D	12	0.4555
SRY Fragment VI (183 bp)	Pattern A	22	0.4074
	Pattern B	32	0.5925

**Table 6.** PCR programmes of the amplicons

Sl No	Primer Name	Initial Denaturation	Cycle			Final Extension	No. of Cycles	PCR product
			Denaturation	Annealing	Extension			
1	SRY Fragment 1,	96 ° C	94 ° C	60 ° C	72 ° C	72 ° C	30	525 bp
		5 min	30 sec	40 sec	1 min	10 mins		
2	SRY Fragment 2,	96 ° C	94 ° C	59 ° C	72 ° C	72 ° C	30	336 bp
		5 min	30 sec	30 sec	45 sec	10 min		
3	SRY Fragment 6,	96 ° C	94 ° C	59 ° C	72 ° C	72 ° C	30	183 bp
		5 min	30 sec	45 sec	1 min	10 min		

**Table 7.** Showing comparison of both the methods of *in-silico* translation

A:First Method ( with selected frame of NCBI-ORF finder)						
Name of the amplicon	Product Size	Position	Amino acid to be replaced	Charge	Amino acid replaced	Charge
SRY Frag. 1	525 bp	F1 A191G	Asparagine	Neutral	Serine	Neutral
		Y A191G	Asparagine	Neutral	Serine	Neutral
SRY Frag.2	336 bp	F1 T77G, F1 T78C	<b>Arginine</b>	<b>Basic</b>	<b>Tryptophan</b>	<b>Neutral</b>
		Y C55T, Y T57G	Phenylalanine	Neutral	Cystein	Neutral
SRY Frag.6	183 bp	No SNPs				
B:Second Method ( without NCBI-ORF finder)						
SRY Frag. 1	525 bp	F1 A71T	Histidine	Neutral	Leucine	Neutral
		Y A73C	<b>Lysine</b>	<b>Basic</b>	<b>Glutamine</b>	<b>Neutral</b>
		F1 G155A	<b>Glycine</b>	<b>Neutral</b>	<b>Aspartic Acid</b>	<b>Acidic</b>
		Y G155A	Glycine	Neutral	Aspartic Acid	Acidic
		F1 G216A	Methionine	Neutral	Isoleucine	Neutral
		Y G216A	Methionine	Neutral	Isoleucine	Neutral
SRY Frag.2	336 bp	F1 A772C	Isoleucine	Neutral	Leucine	Neutral
		Y A772C	Isoleucine	Neutral	Leucine	Neutral
SRY Frag. 6.	183 bp	F1 A1473G	<b>Synonymous</b>		<b>Synonymous</b>	
		Y A1473G	<b>Synonymous</b>		<b>Synonymous</b>	

**Table 8a.** Point mutation observed after multiple alignment of the representative sequence

Region	Transversion	Transition	Loci (SNPs)	Amino Acid Change
SRY Fragment I (525bp)	A/T		F1 A71T,	His to Leu
	A/C		YA73C	Lys to Gln
		G/A	F1 G155A	Gly to Asp
		G/A	Y G155A	Gly to Asp
		G/A	F1G216A	Met → Ile
		G/A	Y G216A	Met → Ile
		T/C	F1 T291C	No change
		T/C	Y T291C	No change
SRY Fragment II (336 bp)	A/C		F1 A772C,	Ile to Leu
	A/C		Y A772C	Ile to Leu
SRY Fragment VI (183 bp)		A/G	F1 A1473G,	No Change
		A/G	Y A1473G	No Change
<b>TOTAL</b>	<b>2</b>	<b>4</b>		<b>6</b>

**8b.** Point mutations in the selected frame with NCBI-ORF finder

Region	Transversion	Transition	Loci (SNPs)	Amino Acid Change
SRY Fragment I (525bp)		A/G	F1A191G	Asn to Ser
		A/G	Y A191G	Asn to Ser
SRY Fragment II (336 bp)		C/T	F1 C55T	Arg by Trp
	T/G		F1 T57G	
	T/G	T/C	Y T77G	Phe by Cys
		T/C	Y T78C	Phe by Cys
<b>TOTAL</b>	<b>2</b>	<b>4</b>		<b>6</b>

SNPs in SRY gene in yak

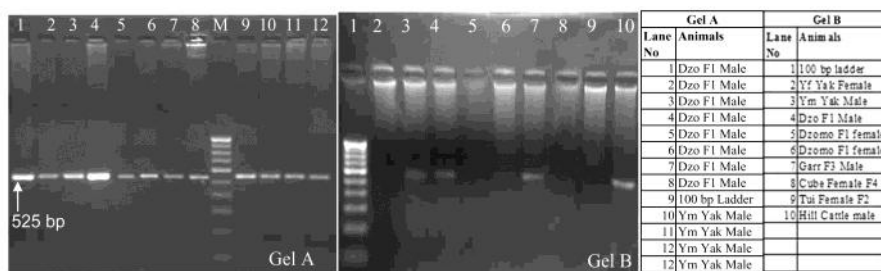


Figure 1: Gel A-SRY 525 bp is expressed in Male of yak, hill cattle and hybrid: Gel B-Females of yak, hill cattle and hybrids have not expressed (agarose gel of 1.5%).

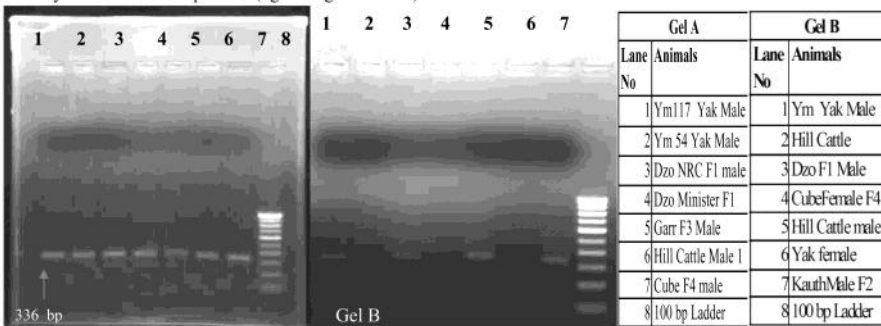


Figure 2: Gel A (336 bp) showed the amplicon expressed in yak, cattle and hybrid male: Gel B showed that the amplicon is not expressed in female counterpart of yak, cattle and hybrids (agarose gel of 1.5%).

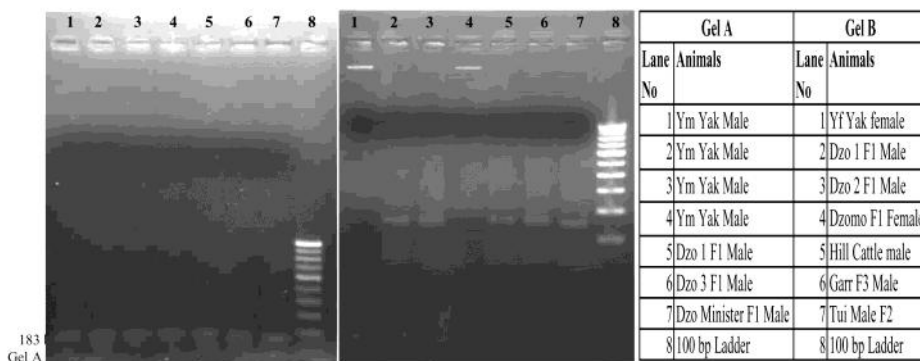
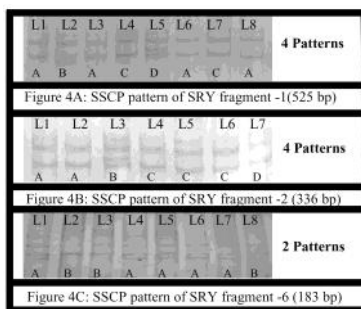


Figure 3: Gel A- Expression of the 183 bp amplicon in yak, cattle and hybrid male: Gel B- Absence of expression of 183 bp amplicon in female counterpart of yak, cattle and hybrid female (Agarose gel 1.5%).



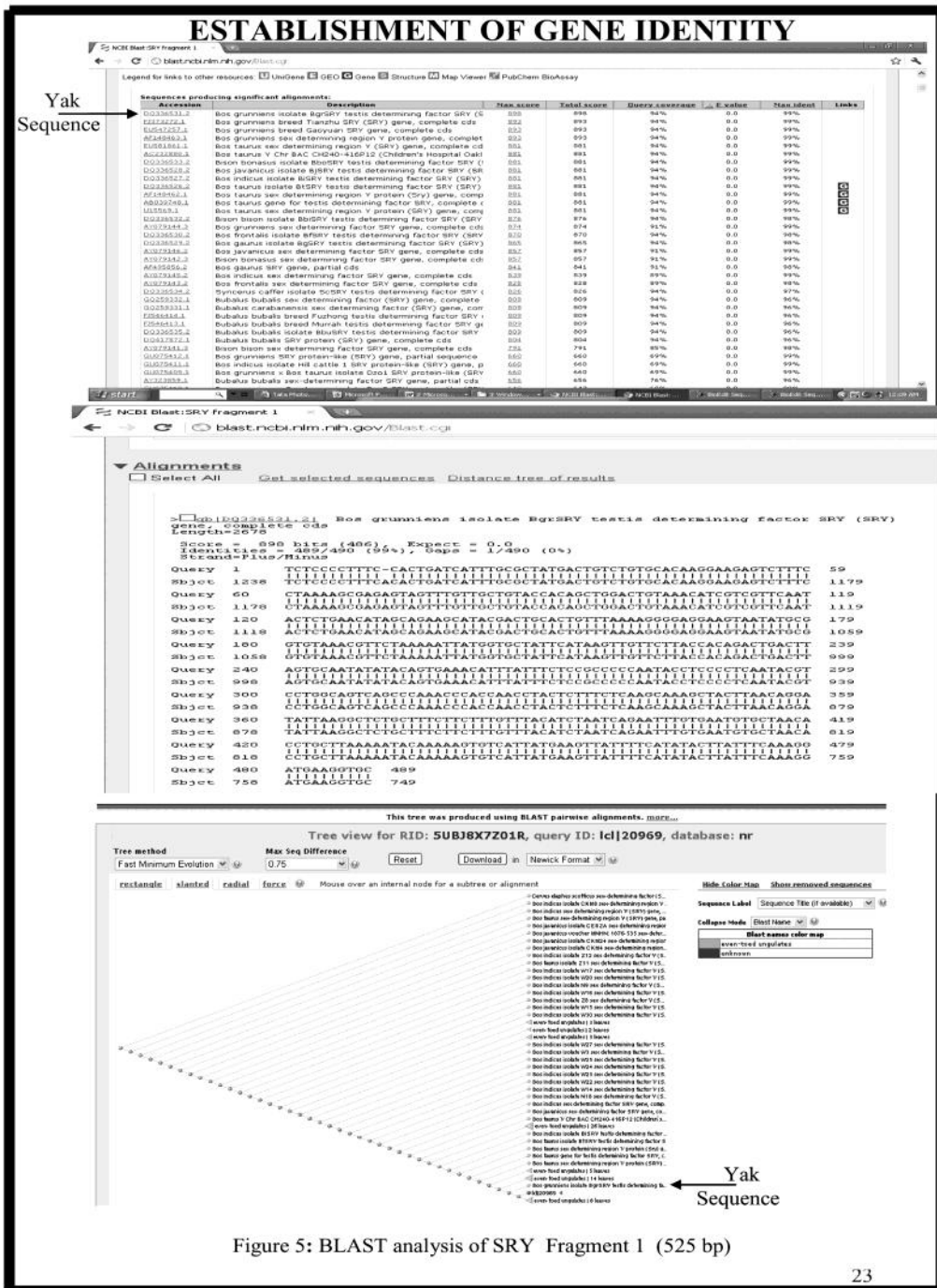


Figure 5: BLAST analysis of SRY Fragment 1 (525 bp)

SNPs in SRY gene in yak

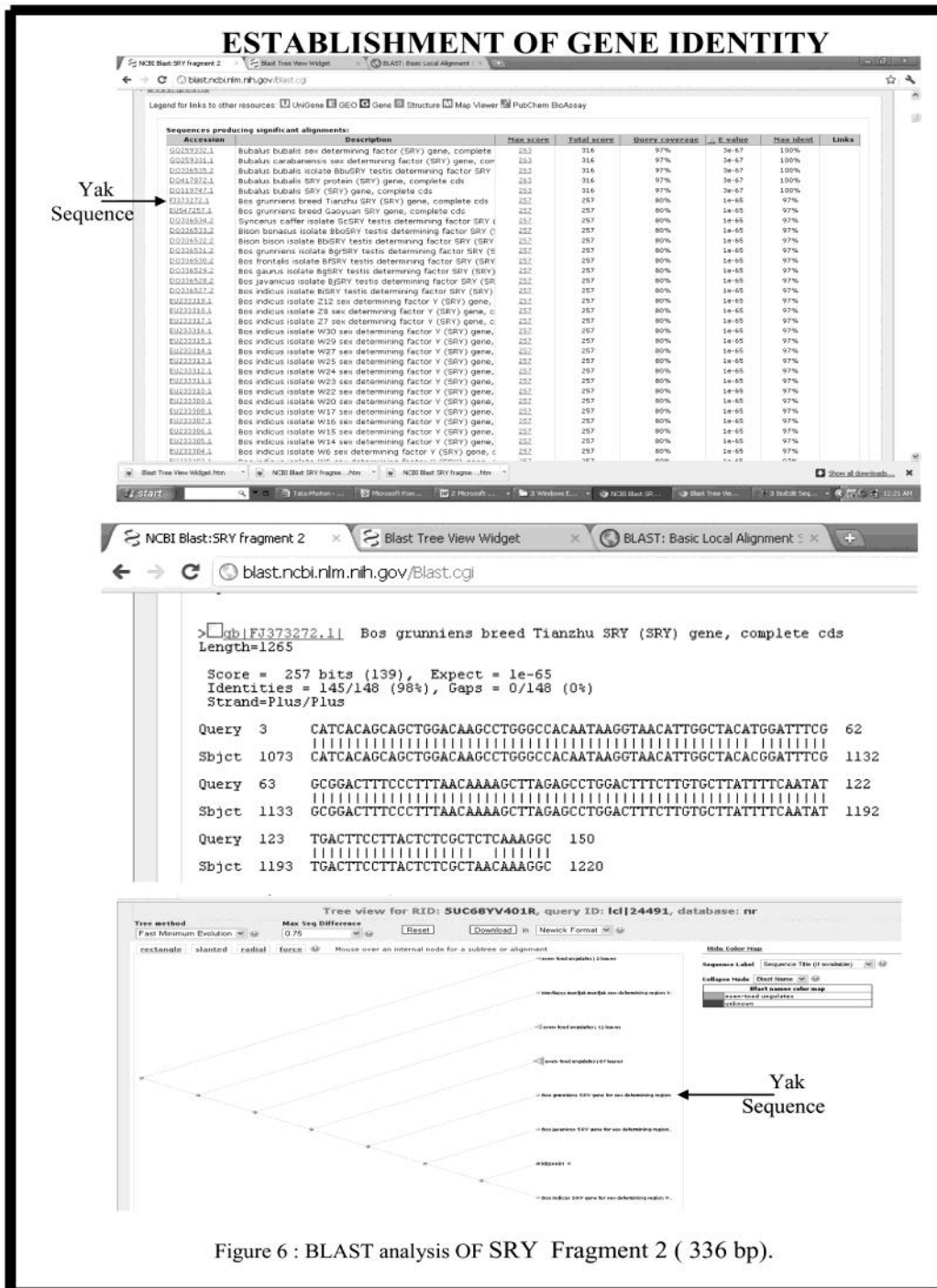
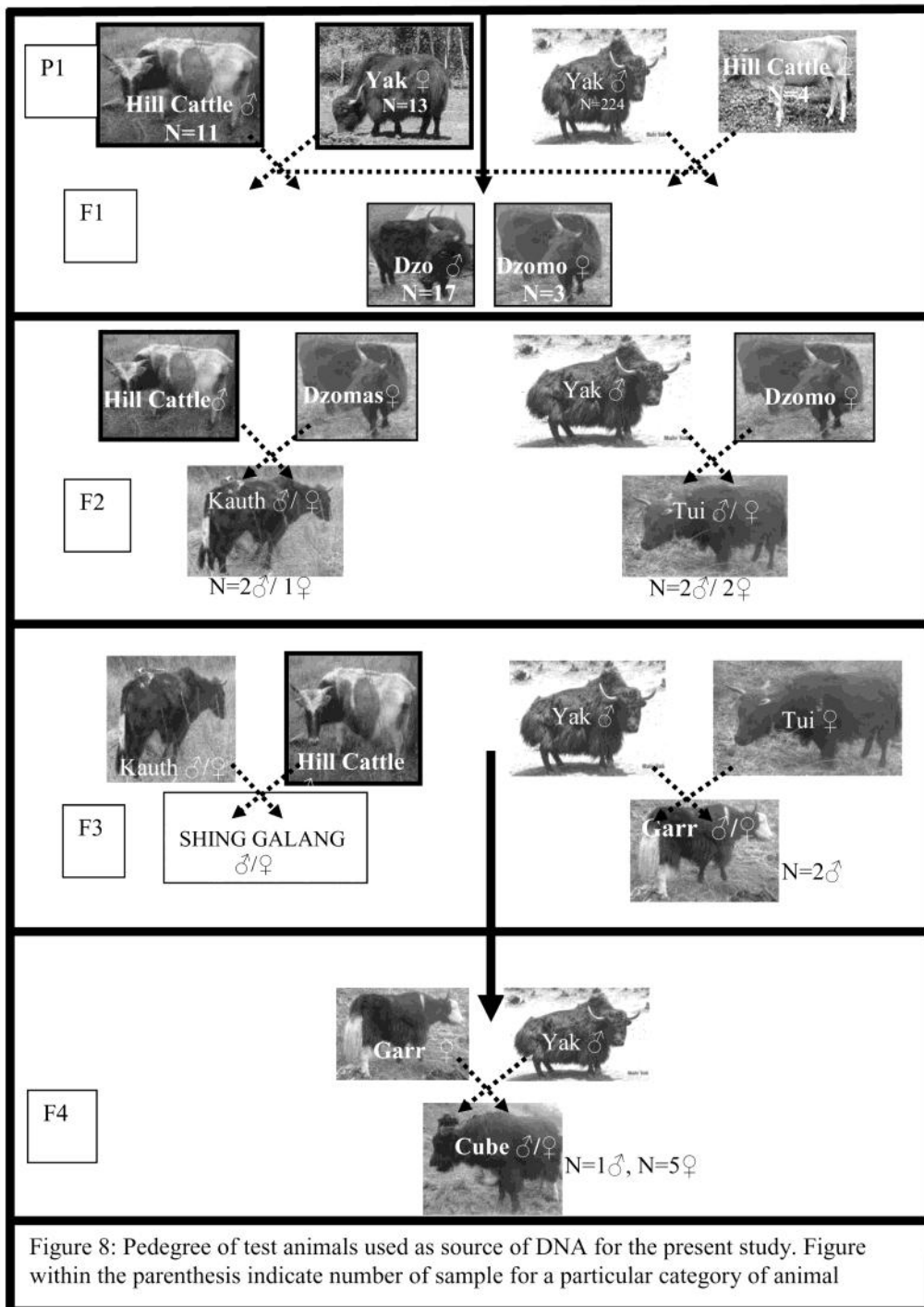


Figure 6 : BLAST analysis OF SRY Fragment 2 ( 336 bp).

## ESTABLISHMENT OF GENE IDENTITY



Figure 7 : BLAST analysis of SRY Fragment 6 (183bp) HMG box.







NeJCR

Vol. 3 Number 1, November 2016

*Humanities*  
*&*  
*Social Science Section*



## Urbanization and Development in the Far East of India

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### ABSTRACT

Urbanization in today's world is indivisible to development and an important predictor economic growth; leading its study to paramount importance. The present study investigates trend of urban population growth in Assam and the increasing inequality in different size-classes towns over the years. Share of urban population and decadal growth rate have been computed for all the districts of the state, correlation was established between urban population in different size-class cities and household urban amenities and development indicators. Findings of the study showed urbanization is skewed towards the principal city and the Gini concentration confirms inequality in urban population is at increase. It has also been seen household and urban amenities are disproportionately distributed over different size-class towns; and the correlation matrix explains the positive direction between development indicators and urbanization in the state.

**Key words :** Development urbanization, population.

### INTRODUCTION

Urbanization refers to the concentration of human populations into distinct areas, leading to transformation of land for residential, commercial, industrial and transportation purposes. In its simplest terms, urbanization refers to transformation of people from predominantly rural to predominantly urban. There is no standard definition of urban; it varies from country to country (United Nations, 2009). The rural-urban classification used in India is a dynamic process, although there are some limitations to the definition (Bhagat, 2005). In the contemporary world, rapid urbanization has been evident particularly

in developing countries. The United Nations has projected that half of the world's population would live in urban areas by the year 2050. Precisely, it is predicted that 64.1% and 85.9% of the developing and developed world respectively will be urbanized by 2050 (United Nations, 2011). Following the same tune the numbers of million plus cities are estimated to be 75 by 2021 (United Nations, 2002). According to the census 2011 the urban population of India constitutes 377 million people and in some quarters, it is estimated to be doubled by 2025. Also in the recent Census, there is a substantial increase

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in the urban population due to rural-urban classification and net rural-to-urban migration. Urban experts believed that India's urbanization would slow down because of its exclusionary nature and its inability to spur rural-to-urban migration (Kundu, 2011). However, the 2011 Census shows some unexpected results. A huge number of new towns emerged during the last decade, contributing significantly to the speeding up of urbanization in India (Bhagat, 2011). There are wide ranging implications of urbanization on socio-economic development hence urbanization along with urban growth is phenomena of increasing concern to both planners and policy makers. Urbanization is one of the significant aspects of social, cultural and economic transformation. New metropolitan cities are going through many socio-cultural and economic transformations which can be reflected in the demographic and spatial pattern of the city (Sita, 2007).

The Eleventh Five-Year Plan suggested that urbanization should be seen as a positive factor in over-all development as the urban sector contributes about 62% of the GDP. There is also a growing realisation that an ambitious goal of 9-10% growth in GDP fundamentally depends upon a vibrant urban sector (Planning Commission of India, 2008). It is well evident that increase in the size of urban population is a common feature. Increase in urban population as well as its geographical extent aggravates demands for basic civic amenities like sanitation, water, electricity, etc. In addition, there is challenge for planners and policy makers to provide employment, both skilled and unskilled, for the migrant masses in the urban areas. Furthermore, urban areas are always in the limelight and inconsistencies of all kind are well reported by the electronic and print media. Therefore, there is always a pressure on the part of the Government to strive forward for development of urban areas. On the other hand, the importance of cities to the modern economy

hardly emphasizes internal scale economies at all. Instead, the emphasis is on external effects, spillovers, and external economies of scale, factors that have all become more important with increased industrialization, technical progress, and economic development. The external effects of the urban environment on productivity indicate that there is a strong positive relation between urbanization and economic development (Quingly, 2008).

**Background of the study area:** Assamese society is traditionally agrarian. The humble people of the state practice subsistent agriculture and allied activities. During British time, the tea plantation and oil industry in Assam established some of the oldest and modern towns of India. Guwahati is considered as "the Gateway" to the north-east. However from 1901 till independence the pace of urbanization in Assam had been extremely slow (Figure 1). At the time of independence only 4% people were urban in Assam whereas in India 17% people were urban. But, after independence and till 1971, there has been steady increase in the urbanization process in Assam. Thereafter, the process took little momentum and in 2011, 14% people become urban. However, it should be noted that throughout this period, the level of urbanization in Assam has been consistently very low as compared to India's level of urbanization. The estimated growth of 7.34% in GSDP of the state for 2010-11 comprises of a growth of 6.49% in agriculture and allied sectors, 4.78% in industrial sector and 8.76% in service sector (Economic Survey, Assam 2011-12).

In view of the above discussion, it is evident that that urbanization has been one of the engines for development because, it brings together a host of other phenomenon. The process of urbanization is associated with changes in the socio-cultural as well as physical mosaic of the landscape. There has been

unanimity among the scholars and policy makers that urbanization brings about changes in terms of economy, culture, transport network, etc. The northeast part of India where the process of urbanization has been relatively slow compared to India and so is the economic development. Therefore, it becomes important to enquire the causes of the slow pace of urbanization. At the same time, economic development of the region over the period of time also needs explanation. The present study is an attempt in this direction to identify regions of urbanization and regions of growth in each of the district of Assam, and the pace of its urban growth, and to identify the inequality in different size-classes towns and establish relationship between urban household amenities, development indicators and urbanization in the state.

## METHODOLOGY

The Census of India data has been used right from 1951 to 2011. It needs mention here that for the year 1981 the Census was not conducted in Assam therefore; no analysis has been carried out for the said year. From the Census of India we have considered General Population Tables and Provisional Population Tables for several mentioned years. The town Directory for Assam from 1971, 1991 and 2001 have been considered for the study. In addition, we have also used the Human Development indicators for Assam and its districts from Planning Commission of India (2011-12); Ministry of Power, Government of India (2009); Information Bureau, Ministry of Health and Family Welfare (MoHFW), Government of India and; Annual Health Survey (AHS) 2011.

To have a clear understanding urbanization in Assam levels, trends and patterns of urban Assam and its districts have been found out. In addition, to establish a relationship between urbanization and selected development

indicators correlation analysis has also been carried out.

### **Gini Concentration Index and Lorenz curve:**

One of the dimensions of urbanization process is the concentration of urban population in few pockets or nodes. Here, concentration specifies to the disproportionate distribution of population at certain locations. There can be several factors for disproportionate unequal distribution. Gini Concentration Index and Lorenz curve can be used to measure the inequality in the distribution of urban population. Gini index measures the ratio of the area between the Lorenz Curve and the equi-distribution line (henceforth, the concentration area) to the area of maximum concentration. Higher value of Gini index indicates greater levels of concentration in the bigger cities in comparison to smaller ones. Gini Concentration Index is given by:

$$G_i = \sum_{i=1}^n (X_i Y_{i+1}) - \sum_{i=1}^n (X_{i+1} Y_i)$$

Where,

$G_i$  = Gini Concentration Index

$X_i$  = Cumulative proportion of urban population

$Y_i$  = Cumulative proportion of urban localities, and

$n$  = Number of urban localities.

## RESULTS

According to the census of India 2011, Assam is one of the least urbanized states of the country and rank third from bottom after Himachal Pradesh and Bihar. At the time of independence, the level of urbanization of Assam was 4% whereas; India had 17% urban population. The year 1991 marks the turning point of the Indian economy because at this time India started globalization and liberalization

of her economy. At this important point in time, the level of urbanization in Assam was merely 11% but, at the all India level one-fourth of India's population was urban. In the last two decades the level of urbanization of Assam has increased to 14% which is much less than the national average of 31.6% in the year 2011. According to the recent Census, there are 88 and 125 statutory towns and census towns in Assam respectively. Although in 1991, the number of census towns in Assam was only 19 and statutory towns were 74 in number.

Table 1 illustrates decadal growth of urban population in districts of Assam since independence. Surprisingly enough, the first decade after independence witnessed the highest growth rate of urban population (12.66%) in Assam. The decades of 1960s showed decreased in the decadal growth rate of urban population (6.5%) whereas; it increased in the next decade to 9.3%. But, thereafter there has been continuous decline in the decadal growth rate of urban population till 2001-11. In the last decade, the decadal growth rate of urban population in Assam was merely 2.76%. In the last decade, the phenomenally high decadal growth rate of urban population of 20% has been found in Nalbari, which is the neighboring to Kamrup Metro. In districts like Tinsukia and Dibrugarh, which is industrialized, the decadal growth rate of urban population has been decreasing since independence. In addition, there are districts like Sonitpur, Bongaigaon and Kamrup where the decadal growth rate for urban population for 2001-11 is -0.26, -0.82 and -8.44 respectively. There are nine districts in Assam where the decadal growth rate of urban population is higher than the state average like Nalbari, Marigaon, Karimganj, Nagaon, Chirang, Cachar, Lakhimpur,

Jorhat. Among these districts, five districts are surrounding the district of Kamrup Metro; these are Nalbari, Goalpara, Marigaon, Nagaon and Chirang. The higher decadal growth rate of urban population in these four districts may be because of the expansion or the influence of the largest city of Assam to its neighbouring districts.

The percentage of urban population is an important indicator of development of a region. After the census of 1991, Assam has only 11% urban population which has slightly increased to 13% after the 2001 Census. After the recent Census, Assam has only 14% urban population. The corresponding figure for urban population in India is 25%, 27% and 31% for 1991, 2001 and 2011 Censuses respectively (Table 2). Thus, it is found that there is a large difference in the urban population in Assam and India. On the other hand, there is wide variation in the level of urbanization in different districts of Assam. Kamrup Metro is the most urbanized district of the state with urban population is as high as 83%. Twenty years back in 1991, the district has only one-third of its population urban but, after that in next Census in 2001 there is unprecedented increased the urban population (80%). Dima Haso is the next most urbanized district of Assam (29%). There are two districts namely Jorhat and Tinsukia which has 20% urban population. According to the 2001 Census, there are only four districts in Assam which has more urban population than the state average these districts are Dima Haso, Jorhat, Tinsukia and Dibrugarh with urban population of 29%, 20%, 20% and 18% respectively. On the other hand, there are 15 districts in Assam with less than 10% urban population. The least urbanized district of Assam in 2011 is Baksa with merely 1.3% urban population.

**Table 1.** Decadal growth rate (DGR) of urban population in districts of Assam, 1951-2011.

State /Districts	DGR	DGR	DGR	DGR	DGR
	1951	1961	1971	1991	2001
	1961	1971	1991	2001	2011
<b>Assam</b>	<b>12.66</b>	<b>6.5</b>	<b>9.3</b>	<b>3.82</b>	<b>2.76</b>
Kokrajhar	--	7.98	19.73	0.15	0.63
Dhubri	11.35	4.35	7.38	1.88	0.49
Goalpara	3.43	6.09	13.64	2.84	10.6
Barpeta	7.65	8.42	4.16	3.04	1.61
Marigaon	--	--	--	1.52	9.29
Nagaon	8.66	4.69	7.24	2.02	4.89
Sonitpur	6.17	13.45	4.52	6.92	-0.26
Lakhimpur	21.59	15.94	9.38	3.26	4.01
Dhemaji	--	--	--	33.68	2.48
Tinsukia	25.16	5.77	4.04	4.11	1.74
Dibrugarh	8.4	6.38	6.04	2.44	0.67
Sibsagar	3.46	10.2	6.25	4.79	1.31
Jorhat	11.15	15.08	5.52	2.88	2.82
Golaghat	17.17	2.69	7.1	6.61	2.05
Karbi Anglong	--	--	59.08	3.05	2.41
Dima Hasao	--	--	--	--	0.3
Cachar	--	--	--	--	5.69
Karimganj	8.1	6.77	0.42	2.23	4.93
Hailakandi	12.65	1.91	5.39	2.91	0.93
Bongaigaon	--	18.58	8.47	4.86	-0.82
Chirang	--	--	--	--	4.21
Kamrup	25.21	4.73	16.14	3.86	-8.44
Kamrup(Metropolitan)	--	-	--	--	2.29
Nalbari	16.92	3.27	4.87	1.71	20.03
Baksa	--	--	--	--	--
Darrang	45.37	6.27	9.89	-3.48	3.28
Udalguri	--	--	--	--	1.34

In Assam, the urban population increased from 12.7% to 14.1% from 2001 to 2011, an absolute increase of 1.6%. In the case of the most urbanized districts of Assam, that is, Kamroop Metro, this increased is 2.7%, from 80.2% in 2001 to 82.9% in 2011. On the other hand, Dima Haso, which is second most urbanized district of Assam, has witnessed decrease in percentage urban population since 2001. All other districts except Dima Haso has observed increased in percentage of urban population. From 1991 to 2001, there is 47 point increase in the urban population in the Kamroop Metro. Alternatively, the increased in the urban population in Kamroop Metro is 2.5 times from 1991 to 2011. Thus the decade of 1990s has witnessed two and a half times increase in the urban population of Kamroop Metro. The relatively less urbanized districts of Assam have observed larger percentage increase compared to

relatively more urbanized districts. This shows that less urbanized districts are catching the pace of urbanization but, it is very slow. For instance, Baksa, which is the least urbanized districts of the state, has 13 times increased in the urban population from 2001 to 2011.

In India, there are six different size classes of cities based on population of cities. In 1971, there were 2 cities with more than 1 lakh population. In the same year, 26 cities had population in between 10,000 to 19,999 and these cities comprised one-fourth of the total urban population of Assam. In 1981, there were five cities in Assam with more than 1 lakh population and these cities constitute 38% of total urban population of Assam. In the same year, 33 cities had population in between 10,000 to 19,999 and these cities comprised about one-fifth of the urban population of Assam. In 2001, cities with more than 1 lakh

population increased to 7. These cities are inhibited by about two-fifth of the total urban population of Assam. There are 44 towns with population 5000 to 9999 in 2001 but, it comprises only 9% of the total urban population of Assam. The number of cities in Assam has risen from 75 in 1971 to 94 in 1991 and finally, in 2001 the number of cities in Assam increased to 131. Thus we find that there has not only been significant increase in the number of cities in Assam but, the pattern of size class of cities in Assam has also changed in the last few decades. Earlier in 1971, cities with population 10,000 to 19,999 comprised one-fourth of the total urban population. On the contrary, cities with more than 1 lakh population constitute about 40% of the total urban population of the state. It is also found that the number of

relatively smaller cities (like 5,000 to 9,999 size class cities) has doubled from 22 in 1971 to 44 in 2001. There has been more than three times increase in the cities with population more than 1 lakh from 1971 to 2001. It should be noted here that relatively smaller cities and the largest cities are growing in number as well as percentage of urban population but, this not been the case with other cities. This is one of the characteristics of the urbanization in Indian cities; whereby, population from rural areas move either to the smaller towns or to the biggest cities. There is no step migration in India from smaller size class to successive larger size class and finally to the largest size class. Therefore, there is extra burden population on the largest cities of India.

**Table 2.** Percentage of urban population, their differences and ratios in districts of Assam, 1991-2011.

Districts	% Urban 1991	% Urban 2001	% Urban 2011	Difference				Ratio	
				2011- 2001	2001- 1991	2011- 1991	2011- 2001	2001- 1991	2011- 1991
Kamrup (Metro)	32.7	80.2	82.9	2.7	47.5	50.2	1.0	2.5	2.5
Dima Haso	22.8	31.6	28.7	-2.9	8.8	5.9	0.9	1.4	1.3
Jorhat	17.6	19.4	20.1	0.7	1.8	2.5	1.0	1.1	1.1
Tinsukia	16.4	19.2	20.0	0.8	2.8	3.6	1.0	1.2	1.2
Dibrugarh	15.2	17.1	18.4	1.3	1.9	3.2	1.1	1.1	1.2
Cachar	12.1	15.8	18.2	2.4	3.7	6.1	1.2	1.3	1.5
Bongaigaon	10.8	13.9	13.8	-0.1	3.1	3.0	1.0	1.3	1.3
Goalpara	10.6	12.2	13.7	1.5	1.6	3.1	1.1	1.2	1.3
Nagaon	10.5	12.2	13.0	0.8	1.7	2.5	1.1	1.2	1.2
Karbi Anglong	9.1	11.3	11.8	0.5	2.2	2.7	1.0	1.2	1.3
Nalbari	7.8	10.5	10.7	0.2	2.7	2.9	1.0	1.4	1.4
Dhubri	7.6	9.2	10.4	1.2	1.6	2.8	1.1	1.2	1.4
Sivsagar	7.3	9.1	9.6	0.5	1.8	2.3	1.1	1.3	1.3
Kamrup	7.2	8.5	9.4	0.9	1.3	2.2	1.1	1.2	1.3
Goalpara	7.1	8.1	9.2	1.1	1.0	2.1	1.1	1.1	1.3
Karimganj	6.5	8.1	9.1	1	1.6	2.6	1.1	1.3	1.4
Sonitpur	6.3	7.3	8.9	1.6	1.0	2.6	1.2	1.2	1.4
Lakhimpur	5.9	7.3	8.8	1.5	1.4	2.9	1.2	1.2	1.5
Barpeta	5.1	6.9	8.7	1.8	1.8	3.6	1.3	1.4	1.7
Morigaon	4.9	6.1	7.7	1.6	1.2	2.8	1.3	1.2	1.6
Chirang	2.3	5.8	7.4	1.6	3.5	5.1	1.3	2.5	3.2
Hailakandi	1.8	5.4	7.3	1.9	3.6	5.5	1.4	3.0	4.1
Dhemaji	NA	4.8	7.0	2.2	4.8	7.0	1.5	NA	NA
Kokrajhar	NA	4.4	6.2	1.8	4.4	6.2	1.4	NA	NA
Darrang	NA	4.3	6.1	1.8	4.3	6.1	1.4	NA	NA
Udalguri	NA	3.9	4.5	0.6	3.9	4.5	1.2	NA	NA
Baksa	NA	0.1	1.3	1.2	0.1	1.3	13.0	NA	NA
<b>Asssam</b>	<b>11.1</b>	<b>12.7</b>	<b>14.1</b>	<b>1.38</b>	<b>1.6</b>	<b>3.0</b>	<b>1.1</b>	<b>1.1</b>	<b>1.3</b>
<b>India</b>	<b>25.72</b>	<b>27.03</b>	<b>31.16</b>	<b>4.13</b>	<b>1.31</b>	<b>5.44</b>	<b>1.2</b>	<b>1.1</b>	<b>1.2</b>



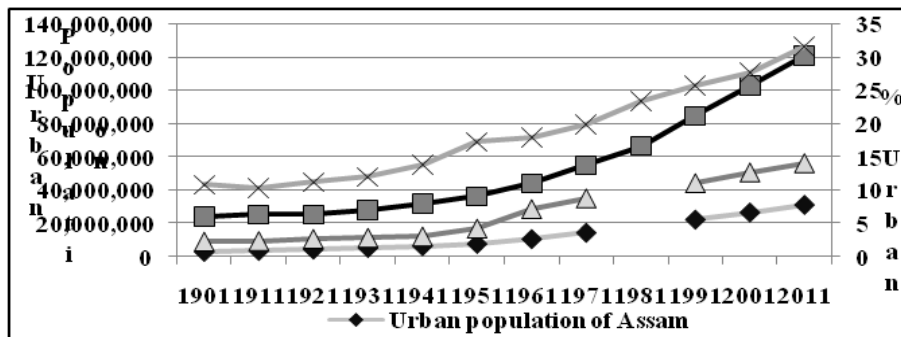
**Table 3.** Number of cities in different size-classes, total population and percentage of urban population in each size-class cities of Assam, 1991-2001.

Class Size of cities	1971			1991			2001		
	No. of town	Total Population	Percent Urban	No. of town	Total Population	Percent Urban	No. of town	Total Population	Percent Urban
Above 100,000	2	252,305	18.66	5	913,982	38	7	1,338,529	38.92
50,000-100,000	6	315,065	23.3	5	288,568	12	8	538,064	15.64
20,000-49,999	10	265,867	19.66	19	543,159	22.6	25	692,025	20.12
10,000-19,999	26	339,065	25.08	33	470,064	19.5	35	507,816	14.77
5,000-9,999	22	153,904	11.38	21	152,438	6.3	44	317,596	9.23
less than 5000	9	25,815	1.91	11	37,814	1.6	12	45,210	1.31
<b>Total</b>	<b>75</b>	<b>1,352,021</b>		<b>94</b>	<b>2,406,025</b>		<b>131</b>	<b>3,439,240</b>	

**Note:** The Figure for 2011 is not given because the Census of India has not published the data yet.

Gini coefficient indicates the spatial inequalities in the distribution of urban population with respect to proportion of size class of towns (Figure 1). From Table 4 it can be seen that the value of Gini concentration index increases consistently from 1971 to 2001 and vindicates the presence of higher the concentration of urban population in class I cities of Assam as compared to smaller cities. The increase in the urban population share and simultaneous decrease relatively smaller towns can be considered as a cause for such a change. It is one of the characteristics of India urbanization

whereby the largest city grows much faster than the smaller cities because people move to the largest city for better employment opportunities and other amenities. The Gini concentration shows that the people living in the urban areas were comparatively uniform in 1971 which was 0.49 which has increased to 0.55 in 1991 and finally to 0.58 in 2001 which shows the growing inequality of population in different size class of towns. This phenomenon puts added challenge to the largest cities in terms of providing very basic amenities to the newcomers.



**Figure 1.** Comparison of trends of urban population growth and percentage urban in India and Assam, 1901-2011.

**Source:** Census of India, 1901-2011.

**Note:** 1. Census was not conducted in Assam in 1981.  
2. Urban population is in '00.

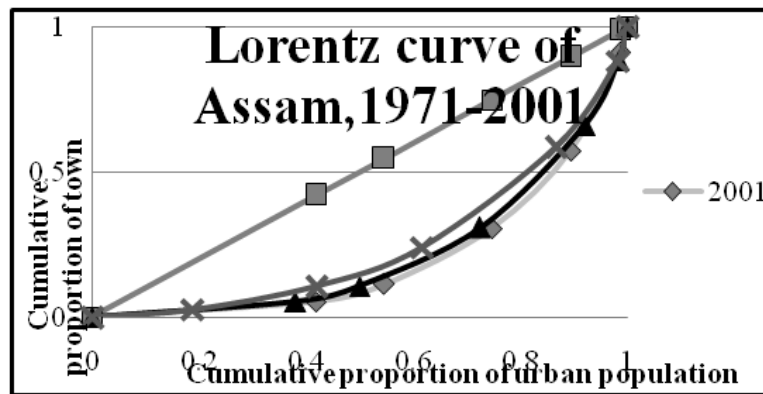


Figure 2. Gini concentration index and Lorentz curve for Assam, 1971, 1991 and 2001.

Table 4. Gini Concentration index for urban population and proportion of towns in Assam, 1971-2001.

Class Size	Population size for each size class of city	1971 Cumulative	1991 Proportion of Urban	2001 Population
I	Above 100000	0.19	0.38	0.42
II	50000-100000	0.42	0.5	0.55
III	20000-49999	0.62	0.73	0.75
IV	10000-19999	0.87	0.92	0.89
V	5000-9999	0.98	0.98	0.99
VI	Less than 5000	1	1	1
<b>GINI</b>		<b>0.49</b>	<b>0.55</b>	<b>0.58</b>

To have an understanding of the development of urban areas in Assam, it is important to visualize it through selected basis amenities in different size class cities of Assam. As mentioned above, class one cities have the largest urban population, followed by class three cities. Similarly, numbers of households are also largest in the class one city followed by class three cities. In the urban areas of Assam, total 333 Government hospitals are available of which 92 (28%) are in the class one cities in 2001. It important to note that in urban areas of Assam one Government hospital is available for

more than 10,000 populations. In addition, one bed in the Government hospital serves 136 people. In the class I cities, one hospital serves more than 14,500 populations; and one bed in these hospitals provide service to 77 people. The condition is comparatively better in smaller towns in terms of hospitals where one hospital serves more than 5500 populations but, one bed provides service to more than 950 people. At the same time it should be noted that the condition of hospitals in terms of availability of basic facilities needs further enquiry.

**Table 5:** Distribution of total population, household and selected urban amenities in different size-class cities of Assam, 2001.

Amenities	I	II	III	IV	V	VI	Total
Population	1,338,529	538,064	692,025	507,816	317,596	45,210	3,439,240
Household	290,939	109,256	136,207	101,331	64,121	8,993	710,847
Hospitals	92	38	63	66	56	18	333
Hospital bed	17217	2544	2707	135	332	2218	25153
Medical college	6	0	0	0	0	1	7
Engineering college	5	0	0	0	0	0	5
Banks	192	97	112	103	76	16	596
Government school	572	381	696	704	746	101	3200

In Assam, there is 1074 Government school for over 3 million urban populations. In other words, Assam has one Government school for each 1075 children in urban areas. In the class one cities, the situation is even worst. There one Government school serves 2340 children. In the Class V and Class VI towns, one Government school serves 425 and 447 children which is the lowest. These statistics indicates that there is urgent need to open new Government school in Class I and Class II cities I Assam. Medical and Engineering colleges are only concentrated in the class I cities. There is only one medical college in the class VI city. Thus, we find that there is concentration of technical Institutions in the class one city only. Again, the class one city has the largest number of banks to serve the people. In the urban areas of Assam, there are 596 banks in total. Alternatively, there are 1.7 banks for per 1000 population in 2001 in Assam. Thus, we have find that Government school are less in relatively larger cities but, higher education and technical education facilities are more in such cities.

After having detailed representation of urbanization in Assam, it is equally important to have a comprehensive picture of urbanization at the district level along with selected development indicators. Kamrum Metro is the most

urbanized district of Assam and the poverty rate is only 13.3 which are the second lowest in the state too. The lowest poverty rate in Assam is in Sivsagar (10.3). It is believed also the increase in the level of urbanization reduces the poverty rate. But, this is not consistent with the level of urbanization in different districts of Assam. For example, in Dima Haso, Jorhat and Tinsukia the poverty rates are 21.3, 21.9 and 29.1 respectively in 2011. These districts just follow Kamrup Metro in the hierarchy of urbanization. On the other hand Dibrugarh, which is the fifth most urbanized districts of Assam, has poverty rate of 14 only. The highest poverty rate of 31.5 is found in the district of Karbi Anglong (34.9) closely followed by Karimganj (33.4), Dhubri (32), Baksa (32.9), and Kokrajhar (32.5). Among all districts of Assam, the literacy rate (LR) is highest in the district of Kamrup Metro. The lowest literacy rate is found in the districts of Dhubri (59.5%) followed by Darrang (64.6%), Chirang (64.7%) and Barpeta (65%). In general, more urbanized districts have literacy rate more than 70% and relatively less urbanized districts have comparatively fewer literacy rate; although this is not very consistent with all districts. The workforce participation rate is one of the important proxy indicators to identify the development of a region. It is also

**Table 6.** Distribution of selected development indicators in different districts of Assam, 2011

District	% Urban	PR	LR	WPR	SD
Kamrup (Metro)	82.9	13.3	88.7	44.6	4.2
Dima Haso	28.7	21.3	79.0	51.2	2.0
Jorhat	20.1	21.9	83.4	56.6	7.7
Tinsukia	20.0	29.1	71.0	48.3	7.7
Dibrugarh	18.4	14.0	76.2	50.1	5.9
Cachar	18.2	29.2	80.4	44.8	10.3
Bongaigaon	13.8	24.0	70.4	44.7	4.1
Golaghat	13.7	14.5	78.3	52.2	8.0
Nagaon	13.0	19.2	73.8	47.2	6.1
Karbi Anglong	11.8	34.2	73.5	44.2	4.1
Nalbari	10.7	15.6	79.9	39.9	5.4
Dhubri	10.4	32.0	59.4	48.5	9.3
Sivsagar	9.6	10.3	81.4	57.4	3.6
Kamrup	9.4	17.4	72.8	47.5	4.8
Goalpara	9.2	26.3	68.7	44.4	10.2
Karimganj	9.1	33.4	79.7	49.3	11.9
Sonitpur	8.9	24.7	70.0	46.6	5.9
Lakhimpur	8.8	20.2	78.4	40.3	9.6
Barpeta	8.7	22.4	65.0	41.0	12.3
Morigaon	7.7	20.3	69.4	46.4	7.3
Chirang	7.4	25.3	64.7	50.1	8.1
Hailakandi	7.3	27.0	75.3	47.6	8.3
Dhemaji	7.0	19.6	69.1	45.3	6.1
Kokrajhar	6.2	31.5	66.6	45.2	9.7
Darrang	6.1	23.3	64.6	48.0	1.1
Udalguri	4.5	28.9	66.6	46.8	7.9
Baksa	1.3	31.9	70.5	49.7	7.3

an evidence of health of the economy of a region. The workforce participation rate of all districts of Assam is less than 50% except few districts like Sivsagar (57.5%), Jorhat (56.6%), Golaghat (52.2%), Dima Haso (51.2%) and, Chirang and Dibrugarh (50.1%). The lowest workforce participation is in the districts of Nalbari (39.9%). Surprisingly, the workforce participation rate is only 44.6% in Kamrup Metro. The school drop-out is comparatively low in Assam. In the first five most urbanized districts of Assam, the school drop-out is as low as less than 6%. More specifically, the school

drop-out is only 2% in Dima Haso and 4% in Kamrup Metro. It is interesting to note that the school drop-out rate is the lowest in the districts of Darrang (1.1%). The highest school drop-out is in Karimganj (11.9%). There are only three districts where school drop-out is more than 10% otherwise the school drop-out rate in all districts of Assam is low. It should also be noted that more urbanized districts have comparatively less school drop-out.

We have tried to show correlation of urbanization with different development indicators. Table 7 (A) shows the correlation matrix

**Table 7 (A).** Correlation matrix of urbanization and selected development indicators, 2011.

	<b>% Urban</b>	<b>PR</b>	<b>LR</b>	<b>WPR</b>	<b>SD</b>
% Urban	1				
PI	-0.3543	1			
LR	0.5875	-0.4703	1		
WPR	-0.0133	-0.1632	0.2004	1	
SD	-0.2676	0.422	-0.1801	-0.229	1

**Note:** PR=Poverty rate; LR=Literacy rate; WPR=Workforce participation rate; and SD=school dropout.

**Table 7 (B).** Correlation matrix of urbanization and selected development indicators in Assam, 2011.

<b>% Urban</b>	<b>PPB</b>	<b>PCEC</b>	<b>HWT *</b>	<b>PCI</b>	
% Urban	1				
PPB	-0.2825	1			
PCEC	0.5636	-0.2374	1		
HWT	0.0529	0.351	0.3102	1	
PCI	0.3723	-0.4154	0.2921	-0.4667	1

**Note:** 1. PPB= Population/bed (served by Govt. Hospitals); PCEC= Per-capita electricity consumption; HWT= Household without toilet; and PCI= Per-capita income. 2. The data for HWT has been borrowed from Annual Health Survey

of percent urban with poverty rate (PR), Literacy rate (LR), workforce participation rate (WPR) and school drop-out (SD). It shows there is strong negative relationship between poverty rate and percent urban. This also depicts that less poor people live in the urban areas. On the other hand, it appears that urbanization and LR is positively related to urbanization. Also, the relationship between urbanization and SD is strongly negative indicating that in urban areas there is less SD. Similarly, in Table 7 (B), correlation matrix of urbanization and development indicators like population per bed (served by Govt. hospital) (PPB), per-capita electricity consumption (PCEC), household without toilet (HWT) and per-capita income (PCI) is given. Here urbanization is strongly negatively co-related to PPB. The table 5 also shows that there is lack of hospitals as well as hospital beds in the urban areas of Assam. Conversely, PCEC and PCI are positively co-related to urbanization. Unlike these, HWT is positively but, weakly related to urbanization.

## DISCUSSION

The current situation of urbanization in Assam and related development is the result of past trends and processes that will define the profile of the future scenarios too. Assam is the most prominent north-eastern state of India not only in terms of areas but, also in economic and cultural fronts. It is also provides passage to all the north-eastern states of India. Therefore, the development Assam is paramount importance for the development of the other states of the region. In this respect, urbanization is one of the important aspects of development because it indirectly speed-up development processes. However, level of urbanization in Assam in 2011 is less than half (14%) of India's level of urbanization (31%). This has been the case throughout the last century although, the level of urbanization increased after independence and more specifically, after 1971. At the district level, there is large variation in the level of urbanization in Assam. Kamrup Metro is the most urbanize district of the state and districts

surrounding Kamrup Metro are also relatively more urbanized. The cities that are developed because of the oil industry are comparatively more urbanized. It is interesting to note that all districts of Assam have lower level of urbanization compared to national average, except Kamrup Metro. In Kamrup Metro, the level of urbanization has increased to two and a half times in the last two decades. It enjoys the privilege of largest city of north-east India.

Like many other state of India, there is increase in the number of cities with more than one lakh population. As expected, the small towns have registered phenomenal increase in Assam in the Census 2011. This may be because of definitional change of the urban area or large numbers of small rural areas have fulfilled the population and economic criteria for being a town (Bhagat, 2011). The increase in the number of town has been remarkable in Class I and Class V towns although, other towns have also grown for the last three to four decades. In the last four decades the distribution of percentage of urban population has increased has changed significantly. During 1970s, Class IV towns constituted largest percentage share of population but, in 2001 the Class I town constitute largest share of urban population. The share of smaller towns has reduced considerably though their number has increased. The possible causes of growth of urban population may be attributed to absolute growth of urban area, migration from rural areas to urban areas, migration from other states, Immigration, natural increase, and last but not the least neglect of the village economy. The fundamental features of urbanization in Assam can be summed up as lopsided urbanization induces growth of class I cities; urbanization occurs without industrialization and strong economic base; urbanization is mainly a

product of demographic explosion and poverty induced rural-urban migration; rapid urbanization leads to massive growth of slum followed by misery, poverty, unemployment, exploitation, inequalities, degradation in the quality of urban life; urbanization occurs not due to urban pull but due to rural push; poor quality of rural-urban migration leads to poor quality of urbanization; and, distress migration initiates urban decay. Therefore, unplanned urbanization has some ramifications like housing problem, growth of slums, problems related to sanitation and water, transportation problems, pollution, inadequate provision of social infrastructure etc. Class I city like Guwahati is suffering from urban poverty, unemployment, housing shortage, crisis in urban infra-structural services these large cities cannot absorb these distressed rural migrants, i.e., poor landless illiterate and unskilled agricultural labourers. Hence the migration to urban class I cities causes urban crisis more acute.

#### **Policy Implication:**

Redirection of investment is recommended to develop strong economic base for small and medium city neglected so far. Redirection of migration flows is required. Since the mega cities have reached saturation level for employment generation and to avoid overcrowding into the over congested slums of mega cities. It is required to build strong economic sector (Kundu and Basu,1998) in the urban economy, growth efforts and investments should be directed towards small cities which have been neglected so far so that functional base of urban economy is strengthened. Then redirection of migration to these desirable destinations will be possible.

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## **Ethnic Conflict in Assam on The Backdrop of Socio-Economic Insecurity**

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### **ABSTRACT**

The paper intends to argue and establish the fact that the ethnic conflict in Assam is the result of socio-economic insecurity and it has its root in the beginning of 13th Century. The arrival of the Ahoms and subsequent conflicts with the local tribes, the colonial rule, and the pressure of continuing illegal influx during the colonial and post-colonial era etc. have a consecutive and consequential role to play to in resulting socio-economic instability in the region taking the form of ethnic conflicts. After independence the state had a requirement of a well-planned socio-economic policy for securing the rights and aspirations of various ethnic groups living over the territory for ages. But no such socio-economic plans have been created for resolving the basic areas of ethnic conflict even now. For this reason only the ethnic conflict of Assam as well as socio-economic frustration of the multi-ethnic state are considered as a socio-politic gimmick of both state and central government. The paper embodies the socio-economic and political causes behind the ethnic conflict in Assam and the prospective direction and resolution for an everlasting socio-political stability of the region.

**Key Words :** Assam, Conflict, Immigration, Bangladesh, Ahom

### **INTRODUCTION**

Assam, situated in the north-eastern part of India has a history of many centuries on immigrants to share. Prior to the British occupation and annexation in the early nineteenth century, the medieval kingdom of Assam had been under the Ahom kings for nearly six centuries.<sup>1</sup> Ahoms, who came from the upper Myanmar, invaded Assam in the year 1228AD. Sukapha founded the Ahom Kingdom. He was the brother of the King of Maulang, a powerful Shan Kingdom in northern Myanmar. Sukapha, after a fight with his brother left Maulang in around 1215 AD and marched towards east. After a hard period of thirteen years he reached

Patkai range of hills which separates Myanmar and Assam and eventually ended up Khamjang in Assam in 1228 AD. Both the Ahoms and Brahminical legends attributed divine ancestry to the Ahoms, describing them as the descendants of the Lord of Heaven, Called Indra by the Hindus and Lengdon by the Deodhais, Ahom tribal priests.

Sukapha, a homeless wanderer who left Maulang with two councillors called Bar Gohain and Burha Gohain, eight nobles and nine thousand men, women and children met repeated resistance from Nagas of the Patkai before finally defeating them frightfully. After

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conquering Patkai and leaving it under his nobles Sukapha crossed the Pangchu pass in the Patkai Mountain and entered the plains of Modern Sivasagar district. The region was between Dikhau and Disang River and was ruled by Morans and Barahis. Sukapha defeated the tribal kings and immediately after that adopted a wise policy of treating them as equal and advocated intermarriage between the Ahoms and the Morans and Barahais and he paved the way by himself by marrying Moran and Barahai princess. Sukapha after establishing his Kingdom and capital in Charaideo in 1253, died in 1268 AD. Followed by a rule of nearly 600 years Ahom kingdom saw a large number of rulers after Sukpha. These rulers for the territorial expansion of Ahom Kingdom either involved in conflict with local tribal kings of Nagas, Kacharis, Chutias, Morans etc. or made treaties pushing them away from their own territory or by making them bow down resulting ultimately in loss of right over their own land. However, there are many instances of peaceful and cordial relations between the two. Sukapha's son *Suteupha* during his regime occupied Kachari territory. *Subinpha*, son of *Suteupha* during his rule included Moran territory in to the Ahom kingdom by marrying Moran princes. *Sukhangpha*, the son and successor of *Subinpha* entered into many battles, most remarkable being the one with the distant Kamata, ruled by Pratapdhvaj. Another ruler *Sutupha* entered into multiple battles with the Chutia King and eventually he was murdered. Another Ahom ruler *Suhenpha* was also involved in a war with the Kacharis on the bank of Dikhau and was defeated in 1490. *Suhungmung* likewise dominated the 'Bara Bhuyan's' and incorporated their territory to the Ahom Kingdom. Ahom King *Pratap Singha* in 1606 defeated the Kacharis at Dharamtika. The Kacharis retreated to Maibong. The Kachari Struggle continued under Bhim Darpa, the

eldest son of the Kachari King. During the rule of Jayadhvaj Singha (1648-63 AD) there was a conflict between Ahoms and Jaintias when Jasamatta Roy, successor of King Jasha Manik demanded before the Ahom King Jayadhvaj Singha that Dimarua, Gobha and two other states, which were protectorates of the Ahoms, be restored to the Jaintias.

The Moamoria rebellion between the Morans, adherents of the Moamara Sattra, and the Ahom kings eventually paved the way for annexation of the depopulated region by the Britishers after the Burmese incursion.

The acquisition of the Diwani of Bengal in 1756 brought the East India Company into direct contact with the Ahom Kingdom.<sup>2</sup> The condition of the Brahmaputra valley at the time of the expulsion of the Burmese was most deplorable. There was major shrink in population in the valley and when British came they were in need of a huge number of trained manpower to tackle their administrative activities and later for their emerging oil, tea, coal and Timber business in the region and for construction of infrastructure created this demand. Assam was not in position to supply such a huge trained manpower to cope with British requirements. This situation resulted in bringing the man power from outside the state by the Colonial Administrators. The Bengali Hindu Babus were the first to come to Assam from the neighboring East Bengal. They were encouraged by the Colonialists to occupy the clerical and supervisory positions in the newly setup British Administrative machinery. Weiner observes:

[E]arly in their administration, the British sought to make use of high-ranking officials from the Ahom government . . . But these officials did not fit into the Anglo-Mughal administrative structure created by the British in Assam. They had never kept written records; even judicial proceedings were

<sup>1</sup>Goswami, The History of Assam From Yandaboo to Partition, 1826-1947, 9.

conducted without recording the statements of witnesses, complainants, or defendants. Moreover, the new administrative offices and titles created by the British, such as *tahsildar* or district revenue collector, were not based on indigenous Ahom administrative structures, but were adapted from British governance in Bengal. It was no wonder, therefore, that the British increasingly imported trained Bengali officers to work in Assam.<sup>3</sup>

They were followed by the Tea laborers from Chhotanagpur, Marwaris and land thirsty Bengali Muslim peasants from the East Bangal/ Bangadesh, Nepalis etc. But it was the continuous migration of Muslims of East Bengali origin - and not the other communities -that threatened the very existence of the indigenous inhabitant of the land.

The objectives guiding the investigation on the central theme of the work are

- 1) The ethnic conflicts in Assam maintain some historical and geo-political link experienced by the region since 12 century A.D.
- 2) The present state of socio-economic unrest in Assam is the result of inadequate and non-operational socio-economic policies of the central government.

#### Ahom Era

**Pre-Historic Account:** Millennia before the arrival of the Ahoms, Assam was occupied by the Austriacs or the Austro-Asiatics. They were supposed to have migrated from the Austronesian and other islands of the Pacific into the Asian mainland. The stone columns or megaliths they placed over the graves of their dead are scattered over different places of Assam, indicating that they inhabited a wide area of the region. Their language Monkhmer had similarities with the dialect spoken by the Munda tribe,

who are also said to have migrated to India from South East Asia. As E.A Gait observes

“...that the Munda Languages were imported by Mongolian immigrants through Assam or Burma whose distinctive physical type became merge in that of the earlier Dravidian inhabitants.”<sup>4</sup>

The khasis and the Jaintias are supposed to be their descendants. The earliest inhabitants of present day Assam are the Bodos. These tribes of Mongoloid stock probably came to Assam much later than the Austriacs however not much known about these early migrations and movements into Assam as the science of history is unknown to the inhabitants of Assam till the arrival of the Ahoms in 1228 AD. Various scattered instances of the land and the mythological clues indicate that the land was ruled by the Danava Dynesty, The Asuras, The Varman Dynesty, The Salastambha Dynesty, Pala Dynesty etc. prior to the invasion of the Ahoms. With the arrival of the Ahom in the territory of Assam resulted in conflicts with the local tribal kings belonging to various ethnic groups like Bodo-Kacharis, Koch Kingdom, The Mataks, the Borahis and the Morans etc. These conflicts centered mainly on the possession and right over land and these resulted from the social, Political and Economic insecurity of the indigenous Assamese people. H.K Barpujari asserts in this context “In the next three centuries the conquerors (Ahom) reduced to submission the Morans, the Borhis and the Nagas and the original inhabitant of the region and brought under effective control the greater part of the Brahmaputra.”<sup>5</sup>

#### MAJOR CONFLICTS DURING AHOM ERA

**Ahom And The Kachari Conflicts (13th Century AD–1854):** The Kacharis may perhaps be described the earliest known inhabitants of the Brahmaputra valley.<sup>6</sup> They came into conflict

<sup>2</sup> Ibid., 11 <sup>3</sup> Weiner, Sons of the Soil, Migration and Ethnic Conflict in India, 92.

with the Ahom kings many a times. During the reign of Suteupha (1268-1281 AD), Sukaphas's successor, the Kachari territory between the Dikhau and Namdang rivers was annexed by the Ahoms. Again during the rule of Suhenpha in 1490 AD, the clash took place between the two where the Kacharis won and recovered their lost territory. A major war broke out between the Ahom and the Kachari kingdom in 1526 AD and the Kacharis, though won the first war, suffered a crushing defeat in the second on the banks of the Dhansiri in 1531 and paved the way for expansion of the Ahom dominance till Dimapur. After expelling the Kacharis completely from Dimapur in the year 1936 by another war,<sup>7</sup> the Ahoms established their new capital at Maibong (north cacher) by the Mahur River. Rudra Singha, on another occasion sent a troop of 70,000 army in 1706 AD to punish Tamradhaj, the Kahari King for boldly asserting their independence. During the Krishnachandra's reign, many Moamarias, who were revolting against the Ahoms, took shelter in the Kachari Kingdom, from where they carried out their raids on Ahom territory. When the Ahom king Kamaleshwar Singha demanded their extradition, Krishnachandra refused, leading to a two year war with ahoms (1803-1805 AD). Who inflicted a crushing defeat on the kacharis and Moamaria allies.

**Ahom And The Chutiya Conflicts (AD1187–1673) :** Chutiya kingdom was established on the north bank of the River Brahmaputra in north-eastern Assam and parts of Arunachal Pradesh by Birpal. The Chutiyas were a Tibeto-Burmese race who secured power in Assam at the same time as the Khen kings and Barobhuyan chieftains (to the west), during the decline of the Kamarupa kingdom. They claimed descent from remnants of the former Mlechha kings of Assam. During the reign of Ahom king Sutuphaa, there were frequent skirmishes between Ahoms and Sutiya. In 1376, Sutuphaa was killed by the Chutiya King

<sup>4</sup> Gait, A Brief History of Assam, 5.

evidently Jayadhvajpal during a friendly encounter. During the following years, both the sides got involved in numerous battles. Dhirnarayan alias Dharmadhvajpal, encountered in many battles with the Ahoms. In 1513, a battle with the Ahoms took place; king Dhirnarayan attacked the Ahom Kingdom both by land and water. The Ahoms were victorious in the battle fought at Dikhomukh. But in 1520, the Sutiya invaded the Ahom territory twice, in the second invasion the Sutiya killed the Ahom commander and were successful in defeating the Ahoms in the battle fought at Dihing. In 1522, Dhirnarayan due to his growing age wished to pass the throne to his son Sadhank Narayan but the prince was too young to handle the duties of being a king, seeing no option Dhirnarayan gave away his throne to Nityapal, who was the husband of his daughter Sadhani. Nityapal belonged to a humble family and had no experience in administration. The Sutiya nobilities and ministers opposed Dhirnarayan's decision of giving away the throne to Nityapal. In 1524, the Ahoms taking advantage of this chance attacked a much weaker Sutiya Kingdom. As a partial culmination of the inter-kingdom feud, the Ahoms took Sadiya and killed Nityapal. Further to strengthen their position, the Ahoms set up colonies in the Sutiya country and a number of Brahmins, blacksmiths and artisans were deported from Sadiya to Charaideo. However the Sutiya went to the countryside where they were still in power and continued their fight against the Ahoms to reclaim their lost territories. The conflict went on for next 150 years until it finally ended in 1673 when the Sutiya fell under the domination of the Ahoms and were absorbed into their state. Rajmohan Nath observes, "The Ahom know the use of gun-powder in fire arms and as a matter of fact, they credited with their first use in India."<sup>8</sup>

**Ahom And The Koch Conflicts (AD1543–68):** The conflict between the Ahom and Koch kingdom was the conflict with an intention to

exert control over of the Brahmaputra Valley by both the kingdoms. It started with Nara Narayana ascending to power and consolidating his hold over the western portion; and it ended with the failure of Chilarai's campaign against Sulaiman Karrani. This was followed by an alliance that soon gave away to a fierce conflict between the Ahoms and the Mughals.

#### **COLONIAL RULE AND IMMIGRATION: A Quick Overview**

The Burmese defeat in the hands of the British East India Company resulted in the signing of the treaty of Yandaboo 'concluded on the 24<sup>th</sup> February in 1826'<sup>9</sup>. This treaty is considered as a watershed moment in the history of Assam as it resulted in the gradual extinction of the dominance of the Ahom Empire after the annexation of the region by the colonial rulers. The primary motive behind the annexation and expansion of the British empire to the North-Eastern frontier of India was however economic. Major colonial policies in Assam were initiated invariably with two objectives in mind which was in fact the case with the rest of India – revenue maximization and resource exploration/exploitation. Direct appropriation of the colony's surplus in the form of revenue was needed to finance the cost of administration, purchase of colonial products, and also to maintain the army.<sup>10</sup>

The colonial empire was keen on producing tea in India as they witnessed China being the sole player dominating this trade. 'In 1834, the First Tea Committee was formed'<sup>11</sup>. Britishers accomplished successful manufacture of Tea in 1837 and started the Assam Tea company in 1839. This tradition of Tea manufacturing demanded huge quantity of labour. In carrying out their operations the

planters had to face immense difficulties, particularly of labour, both skilled and unskilled. The Chinese tea-makers had to be imported in initial stages from their settlements in Singpur, Batavia and Penang. A Chinese tea-maker could not be had at less than rupees fourty where his Assamese counterpart (*tekela*) could be engaged at less than rupees ten. Apart from being costly the Chinese at times proved themselves "intractable and worthless". The unfriendly relations that then existed with the Government of China ultimately forced the planters to resort to local artisans.<sup>12</sup> Till 1843 labourers were imported from China to serve the purpose however the Kacharies were later employed for the cultivation of Tea which was though not proved as fruitful as expected. The people of Assam were reluctant to work as day labourers and under no circumstances at the cost of their own cultivation.<sup>13</sup> The indigenous people were loath to work hard mainly because they had limited wants; they were satisfied with the humblest of food, plainest of clothes and smallest of habitations. The requirements of their daily life were produced by their own toil.<sup>14</sup> The colonial rulers were left with no option but to encourage immigration to fulfill vacuum caused by the short supply of native labours. The main reason for the failure of the native population to respond to this demand was the pattern of Ahom administration. Ahom regime was not much concern about trade and commerce and progressive people's education was virtually absent.

Pertaining to the increasing demand starting 1859 onwards the process of import of the tea garden labourers for the central India started and the legal sanction to this was attributed by the first labour Act passed in 1863. The process of recruitment of these labourers is termed as Arkattis meaning

<sup>5</sup> Barpujari (General Editor), *Political History of Assam*, Volume One, 2.

<sup>6</sup> Gait, *A Brief History of Assam*, 299.

<sup>7</sup> *Ibid.*, 301

licensed recruiters and later through an amendment in 1870 the 'Sardari System' was introduced. The need for migrant labourers was further stimulated by the population decrease in Goalpara and Nowgong district due to 'Black Fever' followed by a devastating earthquake of 1897. Precisely the last two decades of the 19<sup>th</sup> century severely affected the population structure of Assam which made the demand for the migrants from outside Assam authentic for the economic progress of the land. Further the rise of the Jute industry worldwide during the period led the Britishers to expand their trade and facilitate Jute cultivation in Assam creating more demand for the migrant labourers. This demand was however successfully fulfilled by large number of migrant workers due to the railway transport facility newly available then making geographical connection between Bengal and Assam easily accessible. These migrants did not restrict themselves to the industry alone but by the beginning of the 19<sup>th</sup> century the professions like teachers, lawyers, doctors, and journalists, railway and post office workers were largely occupied by the Bengali Hindu migrants. The language factor here played a key role as the Bengali and Assamese languages are quite similar. Bengalis managed to convince the Britishers that the Assamese language was merely a "corrupt and vulgar dialect" and therefore it is the Bengali language that should become the official language of the state of Assam.<sup>15</sup> On the other hand the inflow of the Bengali Muslim land hungry peasants began at a rapid rate towards the western part of Assam to take the advantage of sparsely populated cultivable land of the countryside. This migration resulted in

constituting 20% population of the total bordering district population by the early part of the 19<sup>th</sup> century. With subsequently gaining the land rights this Bengali speaking Muslim community slowly created their own cultural, traditional and linguistic identity. Though initially the immigration policy was formulated to facilitate the East Bengali hard working labourers to make use of the cultivable waste land of Assam to accelerate the economy of the state but soon this policy turned out to be prime source of large scale influx in the subsequent years. These migrants were mainly from the Mymensingh, Rangpur, Bogra and Pabna. This concerning phenomena was first officially publicly revealed by the Census Report of 1911. These Bengali speaking Muslim migrants came with direct confrontation with the indigenous people of the land especially with the Mishing community on the right over the riverine areas. This confrontation later spread across the state with all other communities over all types of cultivable land. To combat with the indiscriminate settlement of these migrants the 'Line System' was introduced by the colonial government in 1920 however in real this system was never fruitful as observed in the Line System Enquiry Committee (LSEC) Report of 1938:

It is not, however only the landholders and leading men among the immigrants who have been convicted of making money out of newcomers, but we heard of many instances of Assamese speculators also... who made large sums of money by selling lands that they had either taken up specially for that purpose or had not taken up at all.

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<sup>8</sup> Chetia, Umesh, *Ahom Burani aru Sanskriti*, 24.

<sup>9</sup> Gait, *A Brief History of Assam*, 340. Chandra,

<sup>10</sup> Chandra, Bipan. *Essays on Colonialism*, 63.

**Table 1.** Source: *Census of India, 1931*

Total Districtwise Immigrants to Assam Velly (1911-1931)						
District	1911		1921		1931	
	Moimansing	Total	Moimansing	Total	Moimansing	Total
Goalpara	34,000	77,000	78,000	1,51,000	80,000	1,70,000
kamrup	1,000	8,000	30,000	44,000	91,000	1,34,000
Darrang	1,000	7,000	12,000	20,000	30,000	41,000
Nagaon	1,000	7,000	12,000	20,000	30,000	41,000

The population growth due to the robust settlement pattern of these migrants affected Nagaon district severely after Goalpara where in specific areas of the district the population growth rate almost reached near 300%. S C Mullan the Superintendent of 1931 Census remarked this trend as an 'invasion of a vast horde of land-hungry immigrants', he writes that the immigrants' 'first army corps passed into Assam and conquered the district of Goalpara' and in another 30 years, Mullan predicted that it would not be improbable that 'Sibsagar district will be the only part of Assam in which an Assamese will find himself at home'.<sup>16</sup>

The influx of the east Bengali migrants resulted in continuous extinction of many tribal villages. In 1933 'Tribal League' under the leadership of Bhimbor Deori was formed. The various ethnic groups under the banner of Tribal League were organized only to protect their right over land, language and culture. Such a socio-political disturbance among the ethnic groups of Assam was supplemented primarily by large scale immigration of Muslim agricultural immigrants from the then East-Bengal under the patronage of the British rulers in the pretext of

enhancement of agricultural outputs and land revenue.

**Figure1.** \*Source: Political History of Assam

Sir Syed Sadullah, the leader of the Muslim League-led coalition ministry facilitated a scheme in order to accommodate the Muslim migrant labourers in all the wasteland of Assam with a view to turn Assam a Muslim majority province however this plan faced severe protest and major criticism and could not turn real as planned. Sir Syed Sadullah continued his \* The

<sup>11</sup> Phukan, Umananda, *The Ex-Tea Garden Labour Population in Assam*, 2.

<sup>12</sup> Barpujari (General Editor), *Political History of Assam*, Volume One, 55.

<sup>13</sup> *Ibid.*, 55

<sup>14</sup> *Ibid.*, 56

map, which has been incorporated in the book, is prepared under the supervision of Dr. M. Taher. intention to materialize his dream of a Muslim dominated Assam during his second return to power in 1943. Along with a few independent members, Gopinath Bordoloi formed a government on 10 February 1946 with an absolute majority in the legislature.<sup>17</sup> Gopinath Bardoloi -led ministry attempted to protect the tribal interest by creating tribal belts and blocks however this effort was failed to safeguarding tribal interest. The partition later in 1947 turned out to be a major blow to the state in terms of accommodating both Bengali Hindu and Muslim migrants to the state. Though the rate of inflow of the Hindu migrants almost stopped in the subsequent time but the migration of the Bengali speaking Muslim population continued to pour in an alarming rate during the post-independence era.

#### **INFUX AND CONFLICTS IN POST-INDEPENDENCE ERA**

When Assam tasted the power of Independence under the new constitution of the Union of India it failed significantly to involve the claims and interests of the Bengali minority groups and tribal communities of the soil reflecting a hegemonial attitude. Further the effort to impose Assamese language upon these groups broadened the gap between the Assamese people and these groups to a considerable distance. These attempts of ethnic dominance over minority tribal groups soon turned boomerang to the Assamese people themselves because of the large scale influx of the Bengali Muslim migrants from the erstwhile East Pakistan especially after partition which was

facilitated by inability of the union to seal off the Indo-Bangladesh border to check illegal immigration and by various inter-governmental treaties and agreements after the partition and the formation of Bangladesh in 1971.

The first popular movement sparked centralizing the issue of immigration was launched by the All Assam Student Union in 1979. AASU's main demands were:

- (1) The detection of foreign nationals on the basis of the 1951 National Register of Citizens,
- (2) The disenfranchisement of foreigners by removing their names from Assam's electoral rolls, and
- (3) The deportation of foreign nationals.<sup>18</sup>

The agitation started in a peaceful manner echoing its voice against economic and political deprivation of the Assamese people in its own soil because of the failure of the state to control migration and illegal influx into Assam. It was considered as a question of survival of the Assamese people caused by the demographic invasion by the illegal Bengali Muslims from Bangladesh. However, during the agitation as well the illegal immigrants continued pour in from Bangladesh stimulating anger of the agitation. This was further fueled by the Central government's decision to conduct election in the state without settling the foreigners issue first along with revising the voters list. The result was devastating as on the first day of<sup>18</sup> Murty, T.S., Assam: The Difficult Years-A Study of Political Developments in 1979-83, 12. election i.e February 14, 1983 violent spread quickly in many areas of the state between the Benagali Muslims and the Assamese speaking tribal which caused the lives of a huge number of Bengali Muslims.

<sup>16</sup> Mullan, Census of India, 1931, Vol III.

**Table 2.** Source: satp.org

Year	Assam	All India	Bangladesh
1901-1911	16.99	5.75	9.1
1911-1921	20.48	-0.31	5.4
1921-1931	19.91	11	7.06
1931-1941	20.4	14.22	17.6
1941-1951	34.98	21.51	0.1
1951-1961	34.95	24.8	29.83
1971-1981	23.8	24.66	31.83
1981-1991	23.8	23.85	22

Nellie Massacre estimates varies from 1200 to 3300. The retaliation later by the Bengali Muslims was done by killing Assamese people. Within a very short span of time the conflict reached a level beyond control but the election still continued and so the ethnic conflicts. Here it is relevant to mention that In *A Philosophy for NEFA (1949)* Verrier Elwin rightly remarks that the first cause of tribal depression was the loss of their land and forests.<sup>18</sup>

The Assam Accord was finally signed in 1985 but till date only a handful of foreigners have been identified and deported till date. It is now to the common understanding of all that the main reason for the limited number of deportation of the illegal migrants was an act named Illegal Migrants Detection (By Tribunals) Act, commonly known as IMDT Act. This act came into effect in 1983. 'The Governor is of the opinion that in practice the IMDT is serving the interest of the illegal migrants. He pointed out over a period of 15 years only 9599 illegal migrants have been identified at out of these only 1454 could be deported, IMDT should be replaced by a major just workable and fair

enactment. He suggested of ground survey teams under a Magistrate and asserted by personnel from border organization which will identify the migrants. Magistrates should be from other states then identified persons should be allowed to appear before the foreigners Tribunals. This will provide judicial sametity.'

<sup>18</sup> The intention of the Congress party to give effect to the act was not clear rather suspicious as the act had the following peculiar character. In the first place unlike the Foreigner's Act, 1951, the jurisdiction of the act was limited only to Assam. Secondly, the act put the onus of proof on the complainant. In other words it was the responsibility of the complainant to prove if someone is illegal migrant or not. The act faced severe criticism from all ends as it was now understood that this act was serving none but the Congress to continue their vote bank politics. Finally on 12 July 2005, based on a petition, this act was declared null and void and unconstitutional. Prior to this effort were made to prevent illegal migration in the form of Immigrants (Expulsion from Assam) Act, 1950 and Prevention of Infiltration to Assam Plan

<sup>17</sup> Goswami, Priyam, *The History of Assam from Yandaboo to Partition, 1826-1947*, 272.



**Table 3. Source: Census Report 2011\***

C -1 POPULATION BY RELIGIOUS COMMUNITY -2011										
Area Name	Total/ Rural/ Urban	Religious communities								
		Total			Hindu			Muslim		
		Persons	Males	Females	Persons	Males	Females	Persons	Males	Females
		1	2	3	4	5	6	7	8	9
State - ASSAM	Total	31205576	15939443	15266133	19180759	9796805	9383954	10679345	5463393	5215952
State - ASSAM	Rural	26807034	13678989	13128045	15699871	8006062	7693809	9877218	5052341	4824877
State - ASSAM	Urban	4398542	2260454	2138088	3480888	1790743	1690145	802127	411052	391075

(PIP), 1964.<sup>20</sup> However, the earlier act was repealed in 1957 and the later failed because of the Central government's inefficiency and corruption. Today these immigrants play a key Role in electoral politics because of their numerical strength and they are used by the political leaders as vote banks and simultaneously they continued to exert pressure on tribal territories by encroaching tribal lands. The displacement of local ethnic groups caused by this massive influx of East Bengali Muslims helped these migrants to continue their annexation to gain as much land as possible. Loss of large areas of traditional tribal cultivation land in the hands of the land hungry east Bengali farmers turned out to be a serious setback for the tribal peasantry section. To a large extent it was also the tendency of the tribal people to live in isolation that contributed to this setback. Many of them then settle down in the forest areas leaving behind their traditional cultivable land. Today these tribal people are facing eviction threat from government and intense conflict is taking place between the two over the right over the land. On the other hand the annexation of the land reserved for the tribal people continues by the illegal Bengal Muslim peasants.

After Tiwas this danger is largely felt by the Bodos which resulted in a series of

conflict between the two in recent times with a historical context over the right over land and economic security. This conflict between the Bodos and the illegal Muslim settlers dates back to 1952 followed by a series of violence during the Assam Agitation, during the period 1991 to 1994, 2008 and in 2012. Though the immediate reason for the conflict of 2012 was identified as the killing of four Bodo men by the Bangali speaking Muslims in BTAD area but the subsequent violence was the outburst of the anger of the Bodo people resulting out of the social and economic insecurity caused by the illegal migrants. Reportedly 77 people were killed and many thousands people were displaced during the conflict of 2012 between the Bodos and the illegal migrants mainly in the BTAD districts of Kokrajhar, Chirang etc. After the violence there was a massive protest in all parts of the state to identify and deport the illegal migrants to avoid such conflicts in the future.

These conflicts could have been avoided by adequate legislation by the government to economically secure the ethnic groups severely affected by the illegal influx. Lack of time specific and solution oriented and practical legislation to address the ethnic tension is a proper way is a main reason today for the

<sup>18</sup> Elwin, Verrier, A Philosophy of NEFA, 62.

<sup>19</sup> The Assam Tribune, December 15, 1998.

<sup>20</sup> Gupta, Shekhar, *Assam: A Valley Divided*, 201.

increasing ethnic conflicts. Central government is also depriving Assam from the economic benefits it should get in comparison to what it produces in terms of natural resources. Rather instead of getting fair share of its development resources from central government state is taking the huge burden of the illegal Bangladeshi immigrants who in turn creating an economic and social turmoil in the state instigating ethnic tension.

### WAYS to CONSIDER

The issue of ethnic conflict is multi-dimensional in nature. It is therefore required to be taken care of considering all its major dimensions that could lead to possible policy implication towards resolving the issue. Land being the main bone of contention here is evident to refer to what historian H.K Barpujari observes. He mentions that the immigration from Bangladesh to Assam is inevitable because of the problems of pressure on land, floods and stagnant economy in overpopulated Bangladesh. A possible way to resolve this would be a collaboration of India, Bangladesh and other neighboring countries and agencies to contribute to the growth and development of the economy of Bangladesh. He considered soil conservation, irrigation, and river valley projects of the Psangpo-Brahmaputra-Barak basins for the protection of both the valleys of Assam and Bangladesh from the recurrent floods.<sup>23</sup>

The cultivable land mass is narrowing every year in Assam because of soil erosion and invasion of the Bangladeshi immigrants. They are now extending to the reserve forest areas exerting a serious threat to the ecology and

environment of the state. The shrinking land resource of the state and increasing encroachment by the illegal Bangladeshi Muslims explains the basic reason for the ethnic conflict in the state. The economic competition between the indigenous people of the soil of Assam and the Bangladeshi immigrants is tough and many cases it is the tribal ethnic groups standing at the losing end. To deal with the economic rivalry it is therefore the responsibility of the Central Government to take measures for the employment of the ethnic groups in the area of public employment. Along with this it must be mentioned here that for a fruitful solution to this problem is a long term policy protecting the indigenous interest involving measures like reservation of seats in the legislative body is desirable. However, it is the political will at last that matters and determines the future discourse of ethnic problems of the state of Assam.

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<sup>23</sup> Barpujari, H. K., *North East India: Problems, Policies and Prospects*, 122.

## **Religions Beliefs and Practices of Mising Tribes of Assam; A Sociological Note**

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### **ABSTRACT**

Mising is a plain tribal community of Assam in North East region of India. Misings are second largest tribal community of Assam. This tribal community belongs to the Mongoloid stock and the language of the community belongs to the Tebeto-Burman branch of Sino-Tibetan family of language. The Misings are mostly found in the districts of Lakhimpur, Dhemaji, Dibrugarh, Sivsagar, Jorhat, Golaghat and Sonitpur. Generally Misings religious cult of Hinduism. The Misings themselves believe to be the progenies of sun and moon. The religion of Misings differs markedly from that genuine Hinduism or vaishnavism. Misings have also their own mythological and ancient stories, all about the creation of living creatures, non-living things, the universe and the existence of super natural powers, as is believed by some other human races, living in the world.

Misings heartily trust Se:di Babu (Sedi the Father), Me:lo Nane (Melo the Mother), Do:nyi (Sun Mother) Po:lo (moon father), Dedong Nane (Rain mother) and Ru:ne (creator) to be their primordial powers having direct or indirect influence in the creation of the universe. The super nature spirits viz., Uye, Urom-Po:Sum, Epom-Yapom and Gu:Min-So:In etc are main Religious deities of Misings.

**Key Words :** Hinduism, Do:nyi, Po:lo, Dedong Wane, Epom Ya Pom, Vaishnavism, Melo Nane, Sedi: Babu, Ru:ne, Uye Urom-Po:sum.

### **INTRODUCTION**

The Misings themselves believe to be the progenies of Sun and the Moon; but they worship spirits which are believed to cause illness death and destruction of human life, animals and crops they are also believes of human soul which according to their belief is immortal.

In fact Mising are worshippers of spirits/deities since time immemorial. The religion of Misings thus differs markedly from that genuine Hinduism or Vaishnavism.

Misings have also their own mythological and ancient stories, all about the creation of living creatures, non-living things, the universe and the existence of supernatural powers, as is believed by some other human races, living in the world.

Kuli(2003:27) states that "Mising heartily trust Se:di Ba:bu (sedi the father), Me:lo Nane (Melo the mother), Do:nyi (Sun Mother), po:lo (Moon Father), Dedong Nane

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(Rain Mother) and Ru :Ne (Creator) to be their primordial powers having direct or indirect influence in the creation of the universe”

Uyes are believed to be very powerful spirits of deads, some of them being well wisher (benevolent) of men and some others envious (malevolent), specially the spirits of those who died their unnatural deaths. Taid (2005) states that “ the peculiarity in Mising religion is that their primordial powers like Se:de-Ba:bu, Me:lo Nane, Ru:ne-Ane etc are normally not propitiated regularly excepting calling upon solemnly in primitive rituals to implore assistance.

Despite that according to the Misings, spirits are many and available everywhere on the earth including sky and physical encircling of human habitates spirits are however, classified into different individuals or groups to their natural abodes like yumrang uye (forest spirits) that habitat in jungles, Asi Uye (marsh spirit) that habitate in water etc. All these spirits travel around the earth in the shapes of air, Cylone, storm, cloud, thunder, lightening etc. Misings worshipping the spirits they offer. Sacrifice of pig or chicken depending upon the importance of the spirit worshipped.

The traditional priest of the Mising is called ‘Mibu’ – who presides over the function of worshipping.

A ritual and all religious functions performed by ‘Mibo’ is performed with their Hinduised priest known as Dhandai, Sadhu Bura, Satula etc. Since immemorial time misings identified themselves as a Hindu and they followed the kalsanghati cult of Hinduism and Mahapurukiya Vaishnavism. In this article we have discuss about the “Religious Beliefs and Practices by the Mising Tribes of Assam.”

#### **Attitude towards concept of soul :**

The Misings beliefs that human soul is immortal. They hold the belief that soul of a person suffers in the world after his death as the Misings believe that concept of heaven and hell. They also beliefs that, soul is immortal and after the death of a man, good soul achieves

salvation and the bad one takes rebirth in a cycle. The Misings beliefs that soul is like as air, no size and it is unseen.

#### **Hell And Heaven :**

The concept of hell and heaven are important concepts for Misings. The Idea of hell refers that those person do not good work in this world that people suffer in hell and they suffered in different diseases, not having good health, who has suffered in the whole life disease that terms called hell. On the other hand the concept of heaven is in the sense of good health living well being and who lives in better in living condition these are called heaven. Misings beliefs that existence of heaven and hell in the world where soul of human goes after the death according to his work and activity done during life time in the world chutia (2004).

#### **Attitude Towards Concept of Death :**

Mising are beliefs that, death is a natural event and it is controlled by a super – natural power, which they beliefs as god. They beliefs that man and animals have allotted days to live on this earth and as soon as the allotted days are over , one has to meet with death and they also beliefs that, man live unto breath, and as soon as the man’s breath fails it is considered as death. According to the Missing tribes death is in the hands of a supernatural power i.e., God.

#### **Procedure of Burial :**

The procedures of Burial is more attractive among the Mising tribes. When the villages get information or news of the death then villages assemble in the premises of the dead and make preparation for Burial. Before the going to Burial ground some rites are performed in the courtyard of the dead, such as message of body with a mixture of background and raw turmeric and then wash the body and put on new cloths reversely. After this, the family members pay homage to the departed

one and then the dead was placed in a wooden box made for Burial or on a bamboo platform and carried the dead with his most essential person belongings to Burial place.

### **Rituals**

Mising observed some important Rituals for their public and family. The traditional or ancestral rituals are Dobur Uie, Teleng Uie etc and some new rituals such as Tithis of Sankardeva, Madhabdeva, Damodardeva, Janmastomi i.e, Birth day of lord Krishna (God) etc. they performed Dobur Uie and Teleng Uie rituals with "Dhandai or Satula" instead of Mibo . However, this rituals are performed by only Kalsanghati. But Mahapurukhiya and Neo-Vaisnavite cult do not performed Dobur Uie and Teleng Uie in general and the Neo-Vaisnavites in particular.

In regard to family rituals, the Mising who followed the Kalsanghati their traditional rituals such as Asi Uie Uram Apin, Butta Dobur, Ka:chan Dobur, Umrang Uie etc, are performed. Besides of the rituals the Misings family perfumed some other new rituals viz., Satjoniya, Na janiya, Na purukhiya, Saki loguwa, Ai Sakam etc by the followers of Kalsanghati and Mahapurukhiya Vaisnavite cult. Some Mising tribes also worship to the Devi Durga. Kalsanghati and Mahapurukhiya Vaisnavite group pay visit to the temples of Devi Durga and Sacrifice pigeon, Duck and goat in general during the Durga Puja. Yein (2012:30) states that are Telang\_uyu ritual is to be performed by a Mibu (Mising traditional priest ) but now is rare to find among Misings in the plains. Thus in his absence the Sadhuburah or Satula performs as main priest assisted by the few Bhakats like Medhi, Sadasar, Kewlia Bhakat, Pokka Bhakat etc.

### **Dobur Rituals :**

Dobur is another important religious ritual of the Mising Tribes. The literary meaning of Dobur stands a sacrifice at rituals for appeasement of the malevolent spirits to mankind casting

ailments in epidemic form and such other misfortunes to mass people in the village in which 'Do' means for eat and 'Bur' for fertility. In some of Dobur rituals the motherly earth is adored reverently for enhancing and to the malevolent spirits to stay restrained from casting maladies to mankind and destruction of prosperities belonging to human beings.

Dobur ritual is of various kinds and may be performed individually and collectivity in village. The peculiarity in its celebration is that the same Dobur may be celebrated differently in the different village or localities which might be due to isolation for long time and also non-existence of central coordination body among different groups of ritual men to make sameness in celebration. The necessary ingredients for Dobur ritual are mainly chicken female swine, egg, rice beer and others. However, the necessity may vary because it depends on the type of ritual.

### **Religious Leadership and Institutions:**

Like other communities Religious leader play an important role in the performance of different religious activities. Thus Mising also have some religious leadership for maintaining their own religious activities related to their community as well as their household and society. Traditional Mising's religious beliefs "Mibo" was the only priest religious functions whether it was of family level or of the community level, were performed either in individual household. When Mising adopted trantric Vaisnavism or Kalsanghati since that time they began to perform most of their religious functions headed by 'Satula' the senior most of the Bhakats. The religious temple that is in which they worshiped that house is known as "Namghar" where collectively religious functions / rituals of the village level are performed by the Misings. All the religious functions except "Dobur Uie" are performed headed by Satula with Bhakats. The offering of prayer to 'Donyee Po:lo' and "Karshing Kartang" is done by reciting Namkirtaniya

except their traditional ritual i.e. 'Dobur Uie' Das and Hazarika (2013) contended that "some Mahapurukhia religious groups has performed religious functions like Tithi of saint Shankaradeva, Madhavdeva, Damudordeva, Shri Krishna Janmastami etc are held in Namghar." However they perform "Dobur Uie" headed by a person who is supposed to know the procedures of performing this ritual known as 'Dhandai' instead of Mibo if the later is not available in place suitable for the rituals.

#### SUMMARY AND CONCLUSION

From the above Discussion it is assumed that the Mising are more deep rooted in religious activities. They performed different religious rituals in different occasions. The Mising religion in traditional periods may be term as mixture of animism, naturalism, and ancestors worship as they worship different deities, sprits and ancestors and offer apong (rice beer) and sacrifice pig and hen to appease these deities and spirits. The finding reveals that the Mising of their traditional and contemporary religious beliefs and practices, it is found that the follower of Kalsanghati cult is still

maintaining their traditional religious beliefs and practices and new ones without much changes.

But in present times some of the Mising people are adopted new religious cult, Neo Vaisnavite, Mahapurukhiy Vaisnavite, Krishnaguru etc. Due to impact of modern education, come into contact with indigenus Assamese Hindu people.

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## Organisational Support in Private Engineering Colleges

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### ABSTRACT

The study is sought to understand the perceptions among faculty regarding Organisational Support. Perceived organizational support is defined as the employees' beliefs with regards to the extent to which the organization values their contributions and cares about their well-being. The study is conducted among 110 private engineering college faculties working in Kadapa district of Andhra Pradesh. The study follows descriptive research design, as the study discusses the levels of perception regarding Organisational Support among faculty working in private engineering college. The study follows probabilistic, multi stage sampling method in selection of sample. The study administers structured questionnaire among engineering college faculty for collection of primary data. The study finds modest levels of perceptions of Organisational Support.

**Key words :** Oraganization, Engineering College, Faculty

### INTRODUCTION

Perceived organizational support is defined as the employees' global beliefs with regards to the extent to which the organization values their contributions and cares about their well-being (Eisenberger *et al.*, 1986). Perceived organizational support can be better understood by looking at it from the social exchange theory. Although social exchange theory got its roots from the theory of economic exchange it defers in the fact that the return, for the most part involves unspecified obligation. Even though there is a clear expectation of return, the exact nature of the return is not predetermined (Blau, 1964). Similarly employees tend to value returns or rewards from the organization. If the rewards and returns are based on the discretion of the organization it is seen as an indication that the organi-

zation genuinely values the employees' contribution and cares for their well-being (Rhoades & Eisenberger, 2002).

This study signifies the levels of perceptions of Organisational Support among faculty working in private engineering colleges. Perception of Organisational Support among faculty is important because it contributes to develop a positive attitude and environment in organisation. The faculty working in a positive environment and attitude produces effective performance. In the present scenario of deteriorating standards of education in private engineering colleges understanding the levels and suggesting HR practices regarding Organisational Support is the notion behind the study.

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**REVIEW OF LITERATURE**

The study understood there are three important antecedents contributing for development of perceptions regarding Organisational Support. The antecedents identified are fairness, supervisor support and human resource (HR) practices.

Fairness is often discussed in terms of two types of justice: distributive and procedural. Distributive justice involves fairness in the distribution of outcomes, whereas procedural justice involves fairness in the procedures used to determine the distribution of outcomes (Greenberg 1990). Shore and Shore (1995) argued that repeated fair treatment would have a strong cumulative effect on POS by indicating a concern for employees’ welfare. Further, they maintained that procedural justice might have a stronger influence on POS than distributive justice. This is because the receipt of outcomes such as promotions and pay raises occur infrequently.

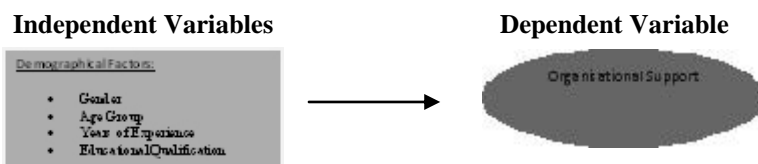
Employees incorporate favorable treatment received from various organizational agents and units into an overall perception of organizational support. Organisational Support Theory assumes treatment received from an organizational agent contributes to Perception of Organisational Support to the extent that the representative’s actions are believed to be sanctioned and promoted by the organization, as opposed to being seen as idiosyncratic motives of the agent. In general, the higher the status or standing the employee believes the organizational agent has within the organization, the more the employee should attribute the actions of that agent to the intent of the organization. The actions and words of high

status employees are seen as closely conveying the favorable or unfavorable orientation toward employees of the personified organization.

Systematic organization-wide policies and procedures directed toward employees, or HR practices, should make an important positive or negative contribution to POS because they are specifically oriented toward employees. Favorable HR practices that signify an investment in human capital and demonstrate recognition of employee contributions have been suggested to promote POS (Allen *et al.* 2003). Indeed, POS has been found to be related to HR practices such as job security, autonomy, training, participation in decision-making and opportunities for rewards and promotions (Rhoades and Eisenberger 2002; Allen *et al.* 2003). The favorableness of a specific HR practice should increase POS to the extent that it is attributed to the voluntary, intentional actions of the organization.

**HYPOTHESIS DEVELOPMENT**

- H1: *There is difference in perception of Organisational Support among men and women faculty.*
- H2: *Older age group faculty exhibit opine higher perceptions of Organisational Support compared to younger age group.*
- H3: *Higher the experience of faculty greater will be the perception of Organisational Support.*
- H4: *Higher degree holders have greater perceptions of Organisational Support.*
- H5: *Faculty in diverse designations has different perceptions of Organisational Support.*



**Figure 1.** Schematic diagram of demographical influence on Organisational Support

## RESEARCH METHODOLOGY

The objective of this study is to understand the perceptions of Organisational Support among various demographic groups of engineering faculty. The study is descriptive in nature, since the study examines and describes the influence of demographical factors on Organisational Support. Demographical factors likewise, Age, Gender, Education Qualification, Year of Experience and Designation are considered as independent variables and Organisational Support as dependent variable. This study is conducted among the faculty members of engineering colleges in Kadapa Dist of Andhra Pradesh. The study collected data through self administered questionnaire.

The sampling design followed for the study is probabilistic, multi stage sampling method technique is used to select sample. The study has collected opinions from 110 faculty members from various Engineering Colleges.

The respondents were asked to rate on 5-point Likert scale from “strongly agree” to “strongly disagree”. The questionnaire consists of two sections, in the first section, questions were asked to measure demographic factors like Age Group, Gender, Year of Experience, and Qualification, Designation. In the second section, the questions related to Organisational Support. Analysis of Variance and Independent sample t-test was employed using SPSS 16.0 to analyze the direction levels of Organisational Support towards the organisation.

## DATA ANALYSIS

The following Table 1 explains the statistic details of demographic factors like Age Group, Gender, Year of Experience, Qualification and Designation.

It is observed from the data, there are 60 (54%) of respondents are in the age groups of 25-30 years, 42(38.2%) of 31-40 Years, 5 (4.5%) of 41-50 years, 3(2.7%) of 51-60 years. The sample comprises 73(66.4%) male and 37 (33.6%) female faculty. Around 60(54.5%) fac-

ulty members have 0-5 Years of Experience, 34 (30.9%) faculty have 6-10 Years, 10(9.1 %) faculty have 11-15 Years, 4(3.6 %) faculty have 15-20 Years and 2(1.8 %) faculty have 20 and above years of experience.

Around 11 (10 %) faculty have graduation degree, 87 (79.1 %) have Post Graduation, 3(2.7%) faculty have NET/SLET, 6 (5.5%) have M. Phil and 3(2.7%) faculty have PhD degree. 97(88.2%) faculty are Assistant Professor, 10(9.1 %) faculty are Associate Professor, 3(2.7%) faculty are Professor and 0 (0%) faculties have other designation like visiting and guest faculty.

The weighted means and Cronbach's alpha of variables of Organisational Support is analyzed. Cronbach's alpha is concerned with the degree of interrelatedness among the set of items designed to measure a single construct. The Cronbach's Alpha for Organisational Support is resulted as 0.736, which is above the standard norms. The weighted mean score of Organisational Support is observed at 3.4, is interpreted as neutral levels of perceptions regarding Organisational Support among engineering faculty.

### Analysis of Organisational Support among Men and Women faculty

The study examines the variance in perception of Organisational Support among men and women faculty members. To analyze the variance in perception of Organisational Support, independent sample t-test is been employed. Organisational Support is considered as dependent variable and gender is considered as grouping variable. The results are been summarized in the following Table 2.

It is observed from the table that there is no significant difference in perception of Organisational Support among men and women faculty ( $t = -.350, p > 0.05$ ). It is been observed from the table that men have lower perceptions of Organisational Support when compared to men faculty. Hence, Hypothesis 1 There is difference in perceptions of Organisational

Support levels among men and women faculty is been rejected.

#### Analysis of Organisational Support among various Age Group of the faculty

The study measures the variance in perceptions of Organisational Support among various age groups of faculty. The study divides

the faculty members into five groups based on age, Likewise 25-30 Years, 31-40 Years, 41-50 Years, and 51-60 Years. The study adopts Analysis of Variance, were age group is taken as grouping variable and Organisational Support as dependent variable. The results of the data analysis are tabulated as follows in Table 3.

**Table 1.** Descriptive Statistics of Demographic factors of Faculty (N=110)

SL. No	Demographic Factors	Number of Respondents	Percentage	
1	Age Group	25-30 Years	60	54.5
		31-40 Years	42	38.2
		41-50 Years	5	4.5
		51-60 Years	3	2.7
2	Gender	Male	73	66.4
		Female	37	33.6
3	Year of Experience	0-5 Years	60	54.5
		6-10 Years	34	30.9
		11-15 Years	10	9.1
		15-20 Years	4	3.6
		21 and above Years	2	1.8
4	Qualification	Graduation	11	10.0
		Post Graduation	87	79.1
		NET/SLET(CSIR)	3	2.7
		M. Phil	6	5.5
		Ph. D	3	2.7
5	Designation	Assistant Professor	97	88.2
		Associate Professor	10	9.1
		Professor	3	2.7
		Others	0	0.0

Source: Analysis of Tabulated data Sig at  $p < 0.05$

**Table 2.** Analysis of Organisational Support levels among Men and Women faculty

SL. No	Gender	No of Respondents	Weighted Mean Scores of Organisational Support	t statistic and p-value (Sig)
1	Men	73	3.46	-.350, .727
2	Women	37	3.51	

Source: Analysis of Tabulated data Sig at  $p < 0.05$

It can be interpreted from the above table that there is a no significance difference in perception of Organisational Support among various age groups ( $F=1.65, p > 0.05$ ). Hence the Hypothesis 2, older age group faculty exhibit higher perceptions of Organisational Support compared to younger age group is rejected.

**Analysis of Organisational Support with respect to Year of Experience**

The study analysis the perception of Organisational Support among the faculty groups based on years of experience. To analyze the data Analysis of Variance is been employed with Year of Experience as Grouping variable and Organisational Support as dependent variable. The results are been tabulated as in the following Table 3.

The study findings from the above table reveals that there is no significant difference in perception of Organisational Support among the faculty members with diverse years of experience ( $F=2.25, p > 0.05$ ). Hence the Hypothesis 3, Higher the experience of faculty greater will be the perception of Organisational Support is rejected.

**Analysis of Organisational Support of faculty based on Qualifications**

In this section, the study analysis the perception of Organisational Support of faculty based on their education levels of the faculty. To obtain the appropriate results, Analysis of Variance is been employed, education qualification is taken as grouping variable and Organisational Support as dependent variable. The results are been tabulated in the following Table 4.

**Table 3.** Analysis of variance of Organisational Support among Age groups of faculty

SL. No	Age Group (In Years)	No of Respondents	Weighted Mean Scores of Organisational Support	F ration and p-value (Sig)
1	25-30	60	3.36	1.65, .183
2	31-40	42	3.59	
3	41-50	5	3.60	
4	51-60	3	4.00	

Source: Analysis of Tabulated data Sig at  $p < 0.05$

**Table 4.** Analysis of Organisational Support levels with respect to Year of Experience

SL. No	Year of Experience (In Years)	No of Respondents	Weighted Mean Scores of Organisational Support	F ration and p-value (Sig)
1	0-5	60	3.31	2.25, 0.07
2	6-10	34	3.64	
3	11-15	10	3.70	
4	15-20	4	3.75	
5	20 and above	2	4.00	

Source: Analysis of Tabulated data Sig at  $p < 0.05$

**Table 5.** Analysis of Organisational Support of faculty based Qualifications

SL. No	Education Qualification	No of Respondents	Weighted Mean Scores of Organisational Support	F ration and p-value (Sig)
1	Graduation	11	3.18	.785, .537
2	Post Graduation	87	3.51	
3	NET/SLET(CSIR)	3	3.66	
4	M. Phil	6	3.33	
5	Ph. D	3	3.66	

Source: Analysis of Tabulated data Sig at  $p < 0.05$

**Table 6.** Analysis of Organisational Support of faculty based Designation

SL. No	Education Qualification	No of Respondents	Weighted Mean Scores of Organisational Support	F ration and p-value (Sig)
1	Assistant Professor	97	3.44	2.79, .065
2	Associate Professor	10	3.60	
3	Professor	3	4.33	
4	Other/Principal	0	0	

Source: Analysis of Tabulated data Sig at  $p < 0.05$

It can be observed from the above table there is no significant difference in perception of Organisational Support of faculty ( $F = .785$ ,  $p > 0.05$ ). Hence Hypothesis 4 Higher degree holders have greater perception of Organisational Support is rejected.

### 5.5 Analysis of Organisational Support of faculty based on Designation

In this section, the study analysis the perception of Organisational Support of faculty based on their designation of the faculty. To obtain the appropriate results, Analysis of Variance is been employed, designation is taken as grouping variable and Organisational Support as dependent variable. The results are been tabulated in the following Table 5

The study findings are summarized in the following table. The study observes there is no significant difference in Organisational Support among faculty ( $F = 2.79$ ,  $p > 0.05$ ). Consequently the study opines the diverse designation groups of faculty have similar levels of perception of Organisational Support. Hence Hypothesis 4 Faculty in

diverse designations has different levels of Organisational Support is been rejected.

## CONCLUSION

The study is required to find the levels of Organisational Support among private engineering college faculty. The study has employed cross sectional analysis based on demographic characteristics. The study considers Gender, Age Group, Year of Experience, Education Qualification and Designation are the demographic factors on which Organisational Support is analyzed. It is found that entire faculty holds similar perceptions of Organisational Support.

However the perceptions of Organisational Support among faculty have observed to be neutral, which is to be focused upon by the management of private engineering colleges. The Management has to follow human resource practices like providing opportunity to faculty

in decision making, training needs, job security, autonomy, and opportunities for rewards and promotions. Positive Organisational Support can give effective teaching, organisational commitment, employee engagement and job involvement.

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## **Problems of women entrepreneurship in Sonitpur district of Assam**

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### **ABSTRACT**

Entrepreneurship is a major strategy for economic development of a country. An entrepreneur is an important constituent of the development process and an integral part of the socio-economic transformation process. As such entrepreneurship is a purposeful pursuit towards initiating, promoting, innovating and mainstreaming economic activities for production and distribution of wealth. Development of a society requires full participation of all section of population including women. Entrepreneurship development among women can be considered a possible approach to economic empowerment of women. A women entrepreneur is economically more powerful than as a mere worker because ownership not only confers controls over assets but also give her the freedom to take decision. This will uplift her social status significantly. Though Indian women are playing important role in society, but their entrepreneurial activities are yet to be explored. Government (at central and state) has undertaken various policies during the five year plans for the development of women entrepreneurship. Consequently, there has been considerable development of women entrepreneurship in Assam. But the field of women entrepreneurship in Assam is full of problems. This paper has given emphasis mainly on prospects and also challenges of women entrepreneurship in Sonitpur district of Assam. The population of the study consists of registered and unregistered women entrepreneurs. A sample of 90 women entrepreneurs are selected for the study on the basis of random sampling. This paper has to explore the hidden prospects of women entrepreneurship and also forwarded some suggestions in improvement of women entrepreneurship in Sonitpur.

**Key words :** Entrepreneurship, challenges, empowerment, transformation, pursuit, development.

### **INTRODUCTION**

Entrepreneurship is a creative process in which specific goals are achieved using various resources in a planned and coordinated manner to perform activities in efficient way. The term

‘entrepreneur’ is of a relatively recent origin and evolving one also. It is mainly associated with economic and industrial development of an economy. Richard Cantillon, an Irishman living

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in France, was the first who introduced the term 'entrepreneur' and his unique risk-bearing function in economics in the early 18<sup>th</sup> century. He defined "entrepreneur as an agent who buys factors of production at certain prices in order to combine them into a product with a view to selling it at uncertain prices in future". Knight (1965) also described "entrepreneur to be a specialized group of persons who bear uncertainty". According to Joseph A. Schumpeter, 'entrepreneur is a 'creative destructor' who creates or causes a dynamic disequilibrium in the economy by taking innovation to commercialization by embedding it in an environment where it did not exist previously'. The entrepreneurship is life blood of an economy. The entrepreneur is one of the most important input in the economic development of a country or region within the country

### **Women entrepreneur**

Women who initiate, organize and control a business activity are referred as 'Women entrepreneur'. For women, entrepreneurship is essentially a journey out of poverty and towards equality and equity. Women entrepreneurs are increasingly being considered to be an important catalyst for economic development. According to Harbison. F (1965), "any women or group of women which innovates, initiates or adopts an economic activity may be called women entrepreneur". Not only do they contribute to employment creation and economic growth through their increasing numbers, but they also make a contribution to the diversity of entrepreneurship in the economic development. Most importantly, their journey shows the transformation of nations from being under-developed or developing to developed ones. In India, women constitute the half of the human resource potential available for economic activities in all the sectors of economy. If this half portion is neglected, and is deprived off from opportunities in agricultural, industrial and tertiary sector, development cannot take place. According to Planning

Commission of India, 'the reason of underdevelopment is the co-existence of unutilized or underutilized manpower on the one hand and unexploited natural resources on the other'. It indicates that full-fledged participation of women in economic activities is the key to economic development as they are around 48.2 percent of the total population in India.

Before independence, women were generally satisfied just with – Kitchen, upbringing of children, Knitting etc. Apart from the household activities, they were engaged mostly in agriculture or at most in the family trade activities. Their participation in market-oriented activities was much less than that of men. The social constraints and attitudes that inhibit the development of women entrepreneurs, the atmosphere in which they have to work and the attitude of the society, altogether were keeping them away from the active work of entrepreneurship. The women entrepreneurs of 50's, 60's, and 70's had accepted both their social and occupational roles. They played two roles and tried to balance both. However, by the time eighties came around, women were educated in highly sophisticated technological and professional education. Many had medical, engineering and similar other degrees and diplomas. Many entered their father's or husband's business as opened up small boutiques, small enterprises of manufacturing and entered garment exports. This was the decade of breakthrough for women in many fields and many frontiers. Women made personal choices, stood up for their convictions and had the courage to make new beginnings. However, all these choices and beginnings was a not smooth sailing. In nineties, the women entrepreneurs were qualitatively a different breed of women. The women of nineties were capable, competent, confident and assertive women. This was the first time the concept of 'the best' rather than a 'male heir' began to be talked about. The fathers thought of 'inheritance' or a 'legacy' to a 'daughter' than just a son who may have been incapable and incompetent.



The 21<sup>st</sup> century is the century of Information Technology. Women's expertise in all these industries is beginning to emerge and women are emerging as a force to rock on with many of these new industries are headed and guided by women who are seen as pioneers and mavericks. Beginning with the 21<sup>st</sup> century, the status of women in India has been changing as a result of growing industrialisation and urbanisation, spasmodic mobility and social legislation. Over the years more and more women are going in for higher education, technical and professional education and their proportion in the work force has also increased. With spread of education and awareness, women have shifted from the kitchen, handicrafts and traditional cottage industries to non-traditional higher levels of activities. Even the government has laid special entrepreneurial training programs for women to enable them to start their own ventures. Women of today have a new avatar in the free rolling 21<sup>st</sup> centuries. Women entrepreneurship has been recognized as an important source of overall economic development. Involvement of women is needed for any sustainable change towards progress. Since 5<sup>th</sup> Five Year Plan onwards women's role has been recognized with a marked shift in the approach from women welfare to women development and empowerment. . Women entrepreneurs account for about 10 percent of total entrepreneurs in India.

Economic history is witness that entrepreneurship development plays a premium mobile role in industrial and economic development of an economy. It is said that an economy is the effect for which entrepreneurship is the cause. Hence increasing emphasis has been given to entrepreneurship development all over the world including India. The emergence of entrepreneurs in a society depends to great extent on the economic, social, religious, cultural and psychological factors prevailing in society. Indian society is multi-stratified. Inter and intra-variations exist between rural and

urban areas, among regions, classes, and different religions, ethnic and caste groups, which led to variations in entrepreneurial activities too.

Over the past half-century, there has been many research resulting in various models and/or theories of entrepreneurship development. However, entrepreneurship as a relatively young field is rife with controversy, breakthrough, and multiple paradigms.

In 1987, Van der and Ronji in a study on small enterprises run by women observed that business headed by women were consistently worse off than others. The few factors responsible for this were, they generally had fewer resources than men, lower level of education and literacy, and by restricted physical and occupational mobility. They also found that, women have less contact, less knowledge of know-how, less bargaining power than men that limited their productivity and probability.

Sangama (2006), the NER of India is unique in terms of indigenous population, different cultural practices, and traditional business practices especially by women one of these states, Meghalaya, strongly follows the practice of matrilineal that allows the women to enjoy property and other rights, and also given the freedom to participate in any cultural, social, religious, political and economic activities have a great potential for successful entrepreneurship, but yet to be exploited for economic development.

Deshpande and Sethi (2009) observed that the biggest challenges of women entrepreneurs are dominated by male dominated society, lesser risk and lack of self-confidence.

Mathew and Panchantham (2011), their study reveals that obstacles on the entrepreneurial performance of women are lack of role model, lack of professional interaction and lack of adequate training.

All the studies on women entrepreneurs' areas are devoted to describe the existing phenomenon. Women entrepreneurs are playing a very significant role in economic development of a country and at the same time they are

facing challenges which are detrimental to the development of women entrepreneur. It is therefore vitally necessary to know the prospects and problems that measures be initiated to remove the various shortcomings so that the women entrepreneurship development programmes can deliver the benefit intended from its implementation. It is in this backdrop that the proposed topic is a need for more specific studies on women entrepreneurship in Sonitpur district of Assam. The present study has been conducted with the following objective :

1. To find out the socio-economic status and infrastructural facility available for the development of women entrepreneurs in Sonitpur district of Assam
2. To find out the interest of women entrepreneur on traditional business/non-traditional business
3. To find out the challenges faced by the women entrepreneurs
4. To find out the ways and means of overcoming the barriers of women entrepreneurship.

#### **Socio-economic profile of the area**

Sonitpur is an administrative district in the state of Assam. The district headquarter is located at Tezpur. As of 2011, it is the third most populous district of Assam (out of 27), after Nagaon and Dhubri. Sonitpur district was created in 1983 when it was split from Darrang district. The name "Sonitpur" as well as "Tezpur" literally means the "city of blood". The name Tezpur is derived from the Sanskrit word "Teza" (meaning blood) and "pura" (meaning town or city). Legend has it that the original name of this place was "Sonitpur". "Sonit" in Sanskrit also means blood but when the battle between Krishna's army fought for the rescue of Aniruddha (who was the grandson of Lord Krishna) there was so much bloodshed that the whole place was stained in red. This led to the name of the place becoming Tezpur. It is the fifth largest city of

Assam after Guwahati, Jorhat, Dibrugarh and Silchar. Sonitpur district occupies an area of 5,324 square kms (2,056 square ml.). According to 2011 census, total population of Sonitpur district is 1,924,110. Sex ratio, literacy rate, density of population, female literacy and male literacy rate are 956 per 1000 male, 67.34 percent, 370, 60.73 percent and 73.65 percent respectively. Sonitpur is home town of two wild-life sanctuaries- Burachapori and Sonai-Rupai. In 1998 Sonitpur district became home to Nameri National Park which has an area of 200 km. It is also home to Orang Natonal Park, which it shares with Darrang district. It was established in 1999 and has an area of 79 km. Sonitpur is a land of natural beauty, ancient monuments and rich cultural heritage. Tezpur is an important tourist destination with beautiful parks, temples and ancient monuments. Tourist spots in Tezpur town are mainly **Chitrlekha Udhyan, Agnigarh, Mahabhairab temple, Bhairabi temple, Rudrapada Temple, Haleswar, Da Parbatia, Hazara Pukhuri, Bamuni Hill, and Bhomoraguri**. Sonitpur district of Assam is an agricultural based district. Traditional dependence on agriculture is one of the reasons for lack of entrepreneurship among the educated youths. They are mostly concentrated on governmental jobs. Absence of major industries in Sonitpur is also partly responsible for lack of entrepreneurial activities

#### **METHODOLOGY**

##### **Sampling design**

Descriptive survey method was used to know the existing condition of women entrepreneurship in Sonitpur.

**Population and sampling:** The population of the study consists of all the women entrepreneurs in Sonitpur. Sample of study was selected on the basis of simple random sampling. Present study was conducted on the basis of both secondary and primary data. Secondary information was collected from District Industrial Centre of Sonitpur district and journals, magazines, newspaper and web. The methods used for collecting primary data were observation,

telephonic communication, and interview. The primary data were collected from sample of 90 women entrepreneurs through a structured questionnaire

#### Tools of analysis

Personal interview was the major tool of data collection. Interview technique was made at women entrepreneurs. The secondary data also proposed to collect from various departments. All these data were arranged in various form of tables and proposed to critically analyse with the help of percentage method.

#### Analysis

##### Socio- Economic back ground of the respondents.

To study the socio-economic

background of the respondents we consider the personnel characteristics of the respondents like age, educational qualification, marital status, family income, business type, size of the business, financial sources, benefit from external sources, registration of enterprises, facilities obtained from DIC, awareness of Government schemes and programmes and spend of business income Since 60.73 percent women are literate in Sonitpur district, so there is a possibility of exploration of quality of women. The factors influence the women to become an entrepreneur in Sonitpur, are mainly financial independence, higher standard of living, economic growth, identity & social security, freedom to take decision and social interaction.

**Table 1.** Socio-economic background of the respondents

Factors	Category	No. of Respodents	Percentage
Age	Factors	18	20
	30-40	34	37.8
	40-50	26	28.9
	50 and above	12	13.3
Marital status	Unmarried	34	37.7
	Married	56	62.2
Educational Qualification	Primary	10	11.1
	Higher secondary	45	50
	Graduate & post graduate	15	16.7
Annual income	Below 10,000	8	8.9
	10,000-20,000	35	38.9
	20,000-30,000	27	30
	30,000-40,000	10	11.1
Business type	Handloom/handicraft	15	16.7
	Cafr/internate	10	11.1
	Beauti parlour	9	10
	Tailoring	10	11.1
	Creche	4	4.4
	Nursary	2	2.2
	Service	4	4.4
	Others	6	6.7

**Table 2.**

Factors	Category	No. of Respondents	%
Source of Financing	Spouse income	30	33.3
	Personal savings	26	28.9
	Loan from banks	25	27.8
	Other source	9	10
Registration of the business	Registered	34	37.8
	Not registered	56	62.2
Facilities obtained from DIC	Training	43	47.8
	Technical	12	13.3
	None	35	38.9
Awareness of the Govt. scheme	Yes	69	76.7
	No	31	34.4
Spend of the business income	Family expenses	40	44.4
	Personal Savings	25	27.8
	Re-investment in her business	25	27.8

Data Source: Primary Data

**RESULTS**

As per the the necessity of women entrepreneurship in Tezpur

- a) Financial independence is regarded by 33% of total respondents as highest necessity of entrepreneurship for wome.
- b) 23% of total respondents are in view of higher standard of living as a necessity of entrepreneurship for women.
- c) Economic growth is regarded by 18% of the total respondents as one of important necessity of entrepreneurship for women.
- d) 13% of the total respondents are in view that identity, social security

**Challenges of women entrepreneurship in Sonitpur**

The potential for developing women entrepreneurship in Sonitpur is high. Women entrepreneurs in Sonitpur are engaged mainly in activities like weaving, knitting, embroidery, jam jelly and pickle making, etc. In recent years it is seen that women entrepreneurs of Sonitpur are venturing into non-traditional field also. These are mainly establishment of beautipourlar, restaurant, garment shop, café, crèche centre, nursery, etc. This is partly because of expansion of entrepreneurial opportunities. In Tezpur, Tezpur Mahila Samitee has played a significant role in giving training facilities (weaving, knitting, embroidery, etc.) to both urban and rural women. There are considerable numbers of women enterprises in Sonitpur.

The main challenges of women entrepreneurs are:

- a) To run any enterprise successfully adequate infrastructural facility is must. During the present investigation the researcher find out the infrastructural problems like inadequate power supply, inadequate building and space, and also

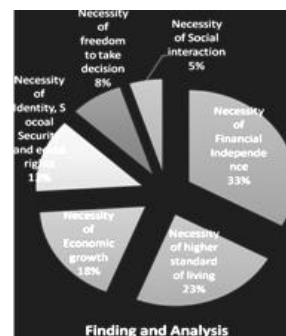


Figure 1. Findings and analysis



Figure 2. Main challenges of Women Entrepreneurs

inadequate communication facilities. 36 percent of total respondents are of the view that inadequate power supply is one of the most important challenges of women entrepreneurs

b) 32 percent of total respondents considered finance is the main problem. Without financial support it is not possible to start a business. Due to paucity of fund many women are not able to start their business in spite of their willingness. Most of the women entrepreneurs start their own venture but they miss the way of success. Women entrepreneurs hesitate to take financial help from banks because of lengthy and complex process.

c) Women entrepreneurs in our society facing various socio-personal problems which prevented them from becoming potential entrepreneurs. These problems are related to family problems, child rearing, limited freedom and also male dominance. During field work, it was observed that most of the women entrepreneurs have identified the dual responsibilities of house-wives and entrepreneurs. This causes problems for the women entrepreneurs. Conflict arises due to dual responsibilities. There is a lack of recognition and appreciation. 7 percent women are not getting support from their husband and 12 percent women are not get support from their family. Majority of entrepreneurs considered entrepreneurship as secondary to their home and family. They have to give importance to their husband, child and their relationship with them.

d) Another problem of women entrepreneurs in Sonitpur is non availability of skill manpower. Most of the entrepreneurs (13 percent) are not getting the opportunities of entrepreneurship training. During the field work it was seen that many women entrepreneurs have lack of knowledge about various government schemes. They have lack of skill to start new enterprise.

e) Adequate marketing is one of the most important factors of success of any enterprise. Generally marketing depends on quality of products, advertisement or publicity, adequate mobility, knowledge of market etc. But in Sonitpur, most of the women entrepreneurs have faced the problems of how to market the product, inadequate publicity, difficulty in travelling, competition with big enterprises, high

production cost and high tax rate. Lack of knowledge in business related activities are major problems of women entrepreneurship.

#### **As per the 4th objective the ways of overcoming the barriers of women entrepreneurship are:**

In view of the problems cited above, it is realised to adopt appropriate measures to accelerate the development of women entrepreneurship. Following recommendations have been made for the development of women entrepreneurship in Sonitpur -

The financial institutions mainly commercial banks can play an important role by giving financial help at low rate of interest to women entrepreneurs for encouraging them.

Awareness among women as well as other people of the society is very much important for women entrepreneurship. In this case, schools and colleges and different NGOs must take initiatives to generate awareness among the girl students.

Government must give emphasis on expansion of training facilities for women entrepreneurs. Training programmes for women entrepreneurs must be conducted from time to time which should give emphasis on finance generation, management procedure, innovative production and marketing.

For unregistered women entrepreneurs, situation must be created so that they are encouraged to register their enterprises to get government facilities and financial assistance from banks.

Moral support from family members is very important for women entrepreneurs.

Net working women entrepreneurs. Moreover for motivating girl students to take entrepreneurial activities, knowledge of entrepreneurship must be included in curriculum of formal education.

#### **CONCLUSION**

Women entrepreneurs have gradually played an important role in spurring economic development and job creation. Equality among men and women which is essential for development of society can possible through economic independence of women. The women entrepre-

neers should take the challenges of new economic policy. Though government has taken various measures to develop women entrepreneurship, still development of women entrepreneurship is not encouraging. Developing entrepreneurship among women will definitely be the right approach for empowerment of women. At present it is a matter of satisfaction that number of women entrepreneurs are coming to start their business. In this case all kinds of support from family members, government, banks and society are needed. Moreover, education, training for entrepreneurship and infrastructural development are also very much important for revolution to entrepreneurship. In 1994, the name Lalita Devi Jain, fondly known as Madhu by the people of Guwahati, Assam has shaped her own destiny in the entrepreneurial arena. She created her own brand "Madhushree" and has marched her way forward to carve a niche in the global market. She started with five looms and over the period of last more than 25 years, she has built up 50 looms. Almost 200 women are employed and they all have become the part of the family to create the brand of Madhushree. The brand Madhushree shows that dedication and positive attitude can help to develop entrepreneurship among women.

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## An Analytical Study on Tribal Economy of Assam with special reference to Goalpara District

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### ABSTRACT

Tribals are the part and parcel of rest of the society. They have been contributing the society in almost all levels of fields, including the economy, basically characterized as subsistence oriented; but an economy of their own having a great speciality. To have transition from traditional to modern economy, tribal people have been trying their level best; but they have yet to go miles. Through this paper it is intended to summarise economy of the tribal communities of Assam with special reference to Goalpara district. Like other regions, the tribal people of Goalpara district, in these days, with socio-political aspirations, are expanding their traditional socio-economic activities, transforming these to modern technology-oriented activities.

**Key words :** Tribal economy, Goalpara district, the Rabhas, the Garos, tribal produce.

### INTRODUCTION

It bears a global connotation that tribals are part and parcel of rest of the society. They have been contributing the society in almost all levels of fields, including the economy. Though tribal economy is basically characterized as subsistence oriented; it has been an economy of their own having a great speciality. This inspires the researchers and scholars to study the subject matter of tribal economy.

The term 'tribe' is derived from the Latin word 'tribus' (the tripartite division of Romans into Latins, Sabines, and Etruscans), which means a social group bound by common ancestry and ties of consanguinity, state of being related by blood or descended from a

common ancestor (Columbia Electronic Encyclopaedia, 2007.)

The word 'tribus' was also used for tribal. In ancient Greece and Rome, the word tribal represented any group of political and demographic subdivisions of the population (Britannica Concise Encyclopaedia, 2008.)

While taking account of the implications of such homely synonyms as simple society, pre-industrial society, or folk society, a satisfactory characterization of tribal society must therefore concentrate upon criteria of form rather than of content. Here the most useful general criterion is that of scale (Wilson, *et al.*, 1965.)

According to Oxford Dictionary, A

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tribe is a group of people in a primitive or barbarous stage of development acknowledging the authority of a chief and usually regarding them as having a common ancestor." The present study has been conducted with the following objectives :

1. To find out a separate identity of tribal economy.
2. To focus on the economy of the tribal people of Assam as a whole and Goalpara district in particular.
3. To identify the economic activities and the produce of tribal people of this area.
4. To find out their socio-economic problems, responsible for their backwardness.
4. To outline a conclusion with some suggestions for the development of their economy.

### **METHODOLOGY**

This research paper is in the form of an explanatory study in analyzing the tribal economy and its potentiality in Assam as well as Goalpara district in terms of nature of the economy, economic activities and produce of tribal people. The present study is based on secondary data, collected from various sources like books, journal, magazine, reports, publications and internet sources. Personal observation is also put forward here. The techniques of synthesis have been applied to analyze the data and as such, the findings and conclusion have been sorted out.

### **Study Area**

Assam, a constituent State of India, is located in North Eastern part of the country and situated within the longitude 90° E to 96° E and latitude 24° N to 28° N. The area of the state is 78,438 sq. kms. The economy of Assam is mainly agrarian in nature. The population of the state is total 31.17 million according to 2011 census of which 1,52,14,345 are female. As regards sex ratio, it is 954 females per 1000 males as per report of 2011 census. Basic data on the position of women in the state vis-a-vis men reveals that there is a glaring inequality between them.

## **RESULTS AND DISCUSSION**

### **Tribal economy**

I.M Lewis believes that tribal societies exhibit a remarkable economy of design and have a compactness and self-sufficiency lacking in modern society.

Some anthropologists believe that tribes developed when more stable and increased economic productivity, brought on by the domestication of plants and animals, allowed more people to live together in a smaller area. A tribe may consist of several villages village, small rural population unit, held together by common economic and political ties. Based on agricultural production, a village is smaller than a town and has been the normal unit of community living in most areas of the world throughout history. (Lewis, 1961)

Economic relations are usually of the subsistence type, although trade and barter often extend outside the community. At the same time, economic differentiation and specialization are not developed, and by modern standards, technological knowledge and environmental control remain restricted.

Tribal economy is basically characterized as subsistence oriented. The subsistence economy is based mainly on collecting, hunting and fishing or a combination of hunting and collecting with shifting cultivation. Even the so-called plough using agricultural tribes do often supplement their economy with hunting and collecting. Simple technology, simple division of labour, small-scale units of production and no investment of capital characterize subsistence economy. Subsistence economy is imposed by circumstances, which are beyond the control of human beings, poverty of the physical environment, ignorance of efficient technique of exploiting natural resources and lack of capital for investment. It also implies existence of barter and lack of trade.

The activities of the traditional economy of the tribes, based on their eco-system and recent "impacts of modernization" may be classified as such: a) Hunting, collecting and gathering, b) Cattle-herding, c) Simple artisan, d) Hill and shifting cultivation, e) Settled



agriculture and f) Industrial urban works.

As far as the economy of Indian tribes is concerned, Mandelbaum mentions the following characteristics among others: a) Absence of strong, complex, formal organization, b) Communitarian basis of land holding, c) Little value on surplus accumulation on the use of capital and on market trading (Mandelbaum, 1972).

In the same line, T.B Naik has also given the following features: a) A tribe has least functional interdependence within the community, for a comparative geographical isolation of its people. b) It has economically backward (i.e. primitive means of exploiting natural resources, tribal economy should be at an underdeveloped stage and it should have multifarious economic pursuits) (Naik, 1956).

A detailed survey of the tribal economy and social organization reveals that diverse forms exist but there are some fundamental characteristic of tribal economy. These can be outlined as follows: a) Dependence on forests and natural environs, b) Unit of production, consumption and input of labour being the family, c) Simple technological base, d) Small profit base in economic dealings, e) The community working as a cooperative unit, f) Periodical markets and fairs at local and regional level, and g) Interdependence among various tribal groups.

Assam has been the abode of many tribes. Almost all tribal groups in Assam do practice agriculture as the situation is fit for. Most of the hill tribes used to practice shifting (jhum) cultivation and plain tribes do both, i.e., Jhum and general agriculture. Naturally, they earn their livelihood in a primitive way by means of exploiting natural resources in forests, lakes (beel) and other fields. They are expert in horticultural practices, catching and drying fishes, collecting forest resources, rearing poultry and cattle etc. The tribal economy in case of Assam is almost alike that in case of Goalpara district.

### **Tribal Economy of Goalpara district**

#### ***Tribal population in the district***

Goalpara is one of the backward districts in the state of Assam. The total population

of the district is in 2011 census is 1,008,183. Out of total rural population, the total number of tribal people are 1,13,401 (18.5 per cent approximately). They are mostly rural as the total number of rural people are 6,16,042 (75 per cent approximately). There are a number of tribal dominated villages in the district. The Rabhas, Bodos, Garos, Hajongs, as the indigenous tribal people, have been living in this rural locality since ages. Moreover, for the Rabhas along with other tribal communities, there is an Autonomous District Council, namely the Rabha Hasong Autonomous Council and they have also been demanding this council as the Sixth Scheduled area. However, as the basic amenities are concerned, they are severely lagging behind still today.

### **Economic Activities**

A common feature of all these is the simple technological base, which allows for limited generation of surplus. The economic relations among the tribal themselves are mostly based on barter and exchange, based on the fact of interdependence amongst the different community. The basic economic activities of the tribals may be classified under the following heads.<sup>2</sup> (a) Food gathering, (b) Pastoral, (c) Shifting hill cultivation, (d) Handicrafts, (e) Cultivation, (f) Trade and Commerce, (g) Labour (Buddhadeb, 1982)

Many tribal groups have more than one economic activity. However, tribal regions are also famous for their traditional handicrafts and artesian skills. Weavers and other craftsmen have always occupied a special position in these societies. Many tribal communities also pursue wood and cane works, metal crafts and stone works.

There is a division between the sexes in terms of tasks performed. For example, in general, women do the sowing and cutting of paddy; whereas the ploughing and levelling fields is largely done by men.

Some tribal communities are also involved in trading activities.

The traditional economy of the Rabhas and Bodos in general, is based on agriculture, forest based activities and weaving.

In the past, the Rabhas used to practice shifting cultivation. They continued to cultivate the land with Go-go or billhook. Later they took up the job of settled cultivation and started cultivation with plough. Besides cultivation, hunting was also an old practice of Rabha people. Weaving was a traditional occupation of the Rabha women. (Mitra, 1953)

Today, one finds Rabhas in diverse occupations from forest workers and cultivators to all modern occupations like school teachers and government office bearers etc., though their number in white-collar jobs would not be very high.

#### **Agriculture and Allied Activities**

Precisely speaking, agriculture and horticulture form the backbone of the economy of tribes of the district. They have an agriculture-based economy. The main occupation of most of the tribal people is agriculture and allied activities. Some of the important crops that form a major part of the economy are Rice, Jute, Ginger, Sugarcane, Chilly, and Mustard etc. Common crops grown here include sesame seeds, castor seeds, mustard seeds, food grains (rice, pulses, maize etc...), pineapples, bananas, papayas, oranges etc. Plenty of the surplus crops passes on to the adjoining areas, where they are marketed elaborately.

The climate is ideal for the growth of a large number of horticultural crops like fruits and spices. Besides, the tribal areas are known for its production of fruits like Pineapples, Bananas, Oranges, etc.

The Southern part of the district is vastly covered with hills; adjacent to Meghalaya is quite rich in natural resources, particularly forest. The landscape of the district is made up of beautiful rock formations and many rivers. It has also the tourism potential in these areas. Most of these natural resources are extracted and sent outside the district only in raw form.

Unlike other tribals of the district, as the matrilineal society of the Garos, property passes from mother to daughter.

#### **Other Economic Activities**

It is already discussed that agriculture is

the principal occupation of the tribal people of Goalpara district. Besides agriculture, a substantial proportion of tribal people are engaged in fishing, forestry, mining and quarrying. Handicraft and handlooms are other major significant income and employment generating activities of the different groups of tribes.

**Weaving:** The most of the Rabha women are expert of spinning and weaving. They have developed their expertise in it to the extent that a fellow Mrs. Lady Rabha won the national prize in weaving. One may find that almost all the households do have their weaving appliances (Tant Sal). The varieties of products they produce, after keeping all the household requirements are sold either in market or in cooperative marketing societies.

**Sericulture:** Most of the tribes of the district used to have sericultural practices.

**Handicrafts:** The tribal people are traditionally experts of making many types of handicrafts. Among these, bamboo products are most remarkable.

**Pisciculture:** The tribes of Goalpara district are of common traditional Pisciculture practices. Many tribal people earn their livelihood with it.

**Rice Bear production and selling:** The tribal people have a socio-religious tradition of indigenous rice bear preparation. In these days, some of them used to prepare it in commercial purposes, through which they are earning a lot.

#### **Other Household Activities**

The tribal people have their very common household businesses of cattle farming, goatery, piggery and poultry farming. All these are used as ATM in their financial hard times. Some of them are involved in commercial mushroom production also.

**Food item collection:** The tribal women generally collect various food items, like leafy and other vegetables, fruits etc from forest and jungles. Out of which, they used to sale in local markets.

**Bamboo, Betel nuts, Orange farming:** Almost all tribal people have their own bamboo fields, horticulture of betel and nuts. In the hilly areas, they used to have orange farms, with a commer-

cial motto. They earn a lot from these commercially viable farms.

**Banana Plantation** - A big banana market has been growing up at Daranggiri under the aegis of Daranggiri Anchalik Unnayan Samiti since about 1973. Variety of bananas, e.g. Malbhog, Chenichampa, Kachkal etc from nearby villages, including Meghalaya are being gathered in weekly basis and at least 30 - 35 nos of loaded trucks are exported to other states and overseas. The process of marketing is kept open for whole the year. This market is recognized as

the largest banana market in Asia. It needs no mention that the producers of all the bananas are tribal people.

**Rubber Plantation** - A great success stories are being written in Goalpara district in lower Assam in case of rubber plantation and its production. In a very short period of time, it has got a remarkable position for its cultivating feasibility and viable financial prospects. It has also a complimentary character of alternative forestry.

**Table 1.** District wise Area and Production of Rubber in Assam during 2010-11

District	Area (in hectare)	Production (in MT)	Tapping Area (in hectare)
Goalpara	7394.08	1675	1056.00
Assam	27082.57	10213	7686.25

Source: The Rubber Board, Zonal office, Guwahati

The credit of the most of the plantation and production goes to the tribal people of the district.

**Tribal Produce:**

The Tribals collect a large number of Minor Forest Produce (MFP) to eke out their

livelihood / supplement their income. All forest products other than timber, firewood and bamboo are included under minor forest produce. The different types of MFP items collected by the tribals using very primitive methods are broadly set out as shown in Table 2.

**Table 2.** Minor Forest Produce (MFP) collected by the tribals using very primitive methods

<i>Food and Beverage</i>	Mangoes, Jackfruit, kendu, tamarind, edible roots (Simalu Alu) and tubers, green leaves, mahua, date palm, salap juice and wild animals and rodents
<i>Oil seeds</i>	Cashew nuts, sal, neem, mahua, karanj, kusum, char and others
<i>Medicinal herbs</i>	Anantamool, chereita, dhunku, patal garuda, gaja pipal, amdantan, bhui nima, shekoy, dhaki flower, arrowroot honey, wild onum, nux vomica
<i>Fuel wood</i>	Brush wood and other woods
<i>Grass</i>	Broom grass sabai grass
<i>House building and Agricultural material</i>	Small timber, thatch grass, creepers and bamboo
<i>Household/Cottage Industries</i>	Siali leaves, arrowroot, karanj seeds, green bark, tamarind seeds, sabai grass, broom grass, tassar cocoons, honey, wax and bamboo
<i>Produce of economic importance</i>	Soapnut, honey and wax, tssar cocoons, mahua flowers, shikakai, kujila, neem, nageswar, sal seeds, simul cotton genduli gum, lac, char seeds, aswand, asok and sisal bark
<i>Fibers &amp; Fossiles</i>	Sialifibre, simul cotton, jungle jute, kharma creepers, swan creepers
<i>Tan &amp; Dye stuff</i>	Myrobalans, fenfena bark, sunaribark, sialibark, kakala bark, datari bark
<i>Leave</i>	Kendu leaves, sal leaves, siali leaves.

### Socio-Economic Problems

The colonial rulers deprived Rabhas, who once used to live in the forest and practice shifting cultivation, of their rights to the forest since the formation of forest department, banning on shifting cultivation and demarcation of forest boundaries. Consequently, with the colonial land settlement system, most of the displaced Rabhas either adopted settled cultivation as sharecroppers or took refuge in the forest villages as plantation labourers. After independence, Indian Government more or less continued the same colonial system of forest management, where the communities like Rabhas could not regain their rights to the forest. (Das, et.al., 1967)

The industrialization and economic changes have greatly influenced the traditional tribal economy. Deforestation, land grabbing by non-tribal, lack of infrastructure and technology has increased pressure on limited resources. The traditional and self-sufficient economy was greatly disturbed. Indebtedness of the tribal for various reasons has been one of the major problems of these areas. Consequently, large number of tribal was forced to look for livelihood outside. Now they are available for mines, factories and agricultural farms as labourers.

The meagre condition of tribal people may be recognized from the following indicators.

a) **Poverty and Indebtedness** - Majority tribes live under poverty line. The tribes follow many simple and primary occupations based on simple technology. The technology they use for the purposes belong to the most primitive kind. There is no profit such and surplus making in economy. Hence there per capita income is very meagre much lesser. Most of them live under abject poverty and are in debt in the hands of local moneylenders.

b) **Health and Nutrition** - In many parts of

India tribal population suffers from chronic infections and diseases out of which water borne diseases are life threatening. Leprosy and tuberculosis are also common among them. Infant mortality was found to be very high among some of the tribes. Malnutrition is common and has affected the general health of the tribal children as it lowers the ability to resist infection, leads to chronic illness.

c) **Education:** Educationally the tribal population is at different levels of development but overall the formal education has made very little impact on tribal groups. Earlier Government had no direct programme for their education. But in the subsequent years the reservation policy has made some changes. There are many reasons for low level of education among the tribal people. Moreover, Most of the tribes are located in interior and remote areas where teachers would not like to go from outside.

d) **Superstitions and myths** – Women killing in the name witch hunting are common here for their age-old superstitions and myths.

e) **Excessive use of liquor** – The tribal people are generally lazy and reluctant in their works due to use of liquor and other narcotics.

The ecological imbalance like cutting of trees have increased the distances between villages and the forest areas thus forcing tribal women to walk longer distances in search of forest produce and firewood. It may also be noted that tribes exist generally until the transition to a class society. The transition is preceded by the stratification of wealth, the rise of a tribal aristocracy and so on.

### CONCLUSION

An economy attributed to a particular community is based upon their socio-economic conditions. The condition of tribal people reflects the economy of the tribes of the concerned area. It is based on the ground early

that there should have their rights over the nature and ecology, where the used to inhibit. So, it should be ensured that the tribal people have the rights in an important source of livelihoods, such as, non-wood (timber) forest products (produce). One of the long-term needs for tribal development is improvement in their quality of life. Old and outdated methods of production, chronic unemployment and serious underemployment contribute to their poverty condition. The only way of raising their productivity in agriculture, horticulture, animal husbandry, forestry, cottage, village and small industries and provision of employment in all seasons, this can reduce the incidence of poverty of tribal people. Moreover, tribal land policy should be improved so that they have no option to question about their belongingness of their land.

Arrangement should be made for an extensive use of modern technology-based production methods in both industrial as well as agricultural sectors. Along with these, development in infrastructure, like- transportation should be brought about for the movement of the produce of the tribal people and communication for marketing. In addition, facilities for the purchase of livestock, fertilizer, agricultural equipment, better seeds should be provided to them. Cattle breeding and poultry farming should also be encouraged among these people.

The Governments should do for encouraging the development of cottage industries by providing loans and subsidies through various schemes. Through multipurpose co-operative societies, they may be provided credit in cash and kind. Government initiated organisations like TRIFED, whose main activities are like retail marketing development; minor forest produce marketing development, skill up-gradation & capacity building of tribal artisans and Research and Development activities should be enhanced. There should be a wide arrangement for promoting tribal

handicrafts and tribal arts through giving chances to participate in various exhibitions and fairs. Elimination of exploitation and enforcement of protective and anti-exploitative measures are the basic needs of tribal development as well as the development of tribal economy. In many cases, tribal men and women are equal participants in their economic life. So, equal opportunity for work for men and women should be implemented.

Superstitions have been playing a negative role in tribal societies of this region. In rectification law enforcement is highly recommended. A change in ideas, norms, values, rituals and religious observances have helped in transformation of the society. A radical change in economic conditions can be brought about through a change in the spirit of the youngsters in seeking new options in the direction of economic development. Political forces like self-ruling have definitely been the important cause of socio-economic change.

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**Science Section**

Taxonomic Diversity and Utilitarian Aspects of Tejpat Spice 1  
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SNPs in SRY gene in yak (*Poephagus grunniens*), hybrids and back crosses 7  
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Sandeep Das, K.P. Ramesha, S. Jaykumar, B.C.Saravanan, T. Biswas, A.K. Handique

**Humanities & Social Science Section**

URbanization and Development in the Far East of India 25  
Bedanga Talukdar and Chandrashekhar Chandrashekhar

Ethnic Conflict in Assam on The Backdrop of Socio-Economic Insecurity 38  
Ractim Goswami

Religions Beliefs and Practices of Mising Tribes of Assam; A Sociological 50  
Note  
Dr. Jayanta Dowarah

Organisational Support in Private Engineering Colleges 17  
P. Srivalli, B. Vijayalakshmi, Kota Neela Mani Kanta

Problems of women entrepreneurship in Sonitpur district of Assam 61  
Mala Mahanta

An Analytical Study on Tribal Economy of Assam with special reference to 69  
Goalpara District  
Nazrul Islam